Professional Development

Unit 5: Special Education

PD 5.2 Inclusive Education

Lecturer Support Material
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Unit outline

Module 2 Inclusive Education is the second module in Professional Development Unit 5 – Special Education. The Lecturers’ Support Material for Modules 1 and 2 booklets are accompanied by the Special Education Student Support Material Part 1. The material is also accompanied by the students’ assessment schedules developed separately in each primary teachers college.

<table>
<thead>
<tr>
<th>Unit</th>
<th>5</th>
<th>Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit 5</strong></td>
<td>5.1</td>
<td>Introduction to Special Education (Core)</td>
</tr>
<tr>
<td>Special Education</td>
<td>5.2</td>
<td>Inclusive Education (Core)</td>
</tr>
<tr>
<td>5.3</td>
<td>Collaborative Planning (Elective)</td>
<td></td>
</tr>
<tr>
<td>5.4</td>
<td>Intervention Strategies (Elective)</td>
<td></td>
</tr>
</tbody>
</table>

PASTEP

Primary and Secondary Teacher Education Project
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Contents

Topic 1  Screening
What will students learn in this topic?  1
How is Screening linked to other topics in Module 2?  1
What is the role of screening in effective teaching?  2
What is screening?  2
Conducting an initial investigation  2
Screening for areas of specific need  4
Further reading  7
Hearing and Vision Screening Form  8
E Chart Vision Test  9
Learning Difficulties Checklist  11

Topic 2  Individualized Planning
What will students learn in this topic?  12
How is Individualized Planning linked to other topics in Module 2?  12
What is the role of individualized planning in effective teaching?  12
What is individualized planning?  12
Further reading  17
Individual Plan Form  19

Topic 3  Task Analysis
What will students learn in this topic?  20
How is Task Analysis linked to other topics in Module 2?  20
What is the role of task analysis in effective teaching?  20
What is task analysis?  21
What are some examples of task analysis?  21
What are the ways that task analysis works in practice?  23
The process of task analysis  24
Sequencing  26
Using pictures  26
Task analysis as a planning tool  27
References  28

Topic 4  Utilizing Aids
What will students learn in this topic?  29
How is Utilizing Aids linked to other topics in Module 2?  29
What are the roles of aids in effective teaching?  29
What are aids?  30
Teaching aids  30
Rehabilitation aids  33
References  35
Topic 5  
**Adapting the Environment**  
What will students learn in this topic?  
How is *Adapting the Environment* linked to other topics in Module 2?  
Why do effective teachers adapt the environment to accommodate students with special needs?  
How do effective teachers adapt the environment to accommodate students with special needs?  
Making the classroom accessible  
Ensuring a welcoming classroom  
References  

Topic 6  
**Peer Tutoring**  
What will students learn in this topic?  
How is *Peer Tutoring* linked to other topics in Module 2?  
What is the role of peer tutoring in effective teaching?  
What is peer tutoring?  
Advantages of peer tutoring  
Tips for successful peer tutoring  
References  

Topic 7a  
**Adapting the Curriculum – Language Difficulties**  
What will students learn in this topic?  
How is *Adapting the Curriculum – Language Difficulties* linked to other topics in Module 2?  
What kinds of language difficulties are students likely to experience?  
How do effective teachers adapt the language curriculum for students with special educational needs?  
What are some examples of adapting the language curriculum for students who need an alternative communication system?  
Further reading  
References  

Topic 7b  
**Adapting the Curriculum – Literacy Difficulties**  
What will students learn in this topic?  
How is *Adapting the Curriculum – Literacy Difficulties* linked to other topics in Module 2?  
What kinds of literacy difficulties are students likely to experience?  
How do effective teachers adapt the language curriculum for students with literacy difficulties?  
Creating a positive and meaningful context  
Responding to actual need  
Phonological awareness and decoding  
Sight word recognition  
Fluency  
Comprehension
**Topic 7c**

**Adapting the Curriculum – Numeracy Difficulties**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students learn in this topic?</td>
<td>66</td>
</tr>
<tr>
<td>How is <em>Adapting the Curriculum – Numeracy Difficulties</em> linked to other topics in Module 2?</td>
<td>66</td>
</tr>
<tr>
<td>What kinds of mathematics difficulties are students likely to experience?</td>
<td>67</td>
</tr>
<tr>
<td>How can the mathematics curriculum be adapted so that students with numeracy difficulties can learn more effectively?</td>
<td>69</td>
</tr>
<tr>
<td>Providing the right content at the right time</td>
<td>69</td>
</tr>
<tr>
<td>Where to start</td>
<td>71</td>
</tr>
<tr>
<td>Providing the right amount of information and practice</td>
<td>73</td>
</tr>
<tr>
<td>Quality instruction that the students understand</td>
<td>74</td>
</tr>
<tr>
<td>Explicit instruction</td>
<td>74</td>
</tr>
<tr>
<td>Easy to hard sequences</td>
<td>75</td>
</tr>
<tr>
<td>Using concrete materials</td>
<td>76</td>
</tr>
<tr>
<td>Making mathematics fun and purposeful</td>
<td>77</td>
</tr>
<tr>
<td>Using and giving feedback</td>
<td>77</td>
</tr>
<tr>
<td>Revision and guided practice</td>
<td>78</td>
</tr>
<tr>
<td>Further reading</td>
<td>78</td>
</tr>
<tr>
<td>References</td>
<td>78</td>
</tr>
</tbody>
</table>
[Notes]
Module 2  Inclusive Special Education

Topic 1:  Screening

Planned hours:  2 lectures (1 hour presentation; 1 hour student activities)
               1-2 hours student research & study

Introduction
In any school or class, it is highly likely that between 10% and 20% of students will have special needs. In many cases, the percentage could be much higher. For example, special education resource centre staff report that around 50% of students in regular schools in Papua New Guinea have some hearing loss, and that many of these students require special assistance. While not all students with special needs actually require much special attention, many students do. Students who do need special education are very unlikely to succeed at school if they do not receive the special education they need.

Teachers need to know what particular learning difficulties, disabilities and other special needs, their students have in order to meet their students particular needs. While teachers are not medical practitioners, clinicians or school psychologists, there are some steps that teachers can easily take towards identifying students with special educational needs. Teachers can also call upon assistance from their nearest special education resource centre to assist with identification.

What will students learn in this topic?
- Students will review the need for screening in schools
- Students will explore screening methods and purposes
- Students will explore avenues for gaining assistance with screening
- Students will examine procedures for utilizing information gained through screening

How is Screening linked to other topics in Module 2 – Inclusive Special Education?
Understanding students’ special needs is essential for effective teaching. Screening, identification and assessment are critical components of individualized planning (Topic 2), provision of suitable materials (Topic 3 Utilizing Aids) adapting the environment (Topic 4) and adapting the curriculum (Topics 7a, 7b & 7c).

Class discussion
How many students are likely to have special needs in a typical class?
How will you know which students have special needs?
Are students’ special needs likely to be permanent or temporary?
Who can help you find out which students have special needs?
Rationale

*What is the role of screening in effective teaching?*

Many students with disabilities are diagnosed at birth or soon after birth. Parents usually know if there is something very different about their young child. However, school brings up a whole range of new experiences, activities and expectations for children, and it is very often only when students begin school that some disabilities begin to affect children’s development. The most common example of this is learning difficulties. While parents usually know if their child has moderate or severe intellectual disability, they often don’t know that their child has learning difficulties or mild intellectual disability until the child begins to experience difficulties at school. In some cases, too, learning difficulties are actually caused by poor instruction in the early years of school, and the students can begin to struggle as their schoolwork becomes harder (especially as reading become more demanding). Mild vision impairment can also only become more obvious at school. At home, the child is not usually required to work with very fine detail but at school, they are confronted by fine print as they learn to read.

It is also true that some disabilities don’t occur until students are slightly older, some disabilities occur suddenly as a result of disease or accident (*e.g.*, ear infection, ingestion of poison chemicals) and some disabilities progress gradually and families don’t always notice the progress of the disability (*e.g.*, some types of vision loss, gradual hearing loss, diseases affecting movement and coordination).

Teachers need to be vigilant, and look out for students who are struggling. Whenever a teacher suspects that a child might be struggling, it is important that the teacher investigates the situation, talks to the parents about any concerns and screens the child for any suspected difficulty. It is also important that the teacher seeks further assistance if a problem is revealed or if the problems continue for no apparent reason.

Description

*What is screening?*

Screening is a set of simple steps that teachers can take to identify students’ special educational needs. Screening involves:

- Looking for warning signs
- Conducting an initial investigation
- Screening for areas of specific need

Teachers should observe their students carefully and take note of any particular problems that a student may be experiencing. If a problem is suspected, then the teacher should conduct screening. The warning signs of students with learning difficulties or other special needs are:

- The student is unwell, often unwell or often misses school due to sickness
- The student struggles to keep up with other students or does not complete classwork
- The student doesn’t always understand instructions
The student is rejected by other students
The student appears clumsy or awkward
The student seems to favour one eye or one ear
The student dislikes school or seems unhappy at school

Young students showing any of these signs could have learning difficulties or other special needs at school. If any of these signs are apparent, the teacher should investigate the situation further.

**Conducting an Initial Investigation**

If warning signs are apparent, the teacher should:

- Discuss the problem with the parents and try to find out any reasons for the problem
  - *Do the parents know of any particular problem or concern?*
  - *Do the parents know of any reason why the student might be struggling or unhappy?*
  - *Has the student been ill?*
  - *Has the student had sore ears or eyes?*
  - *Has the student been seen by a doctor or clinic recently?*

- Discuss the problem with the student’s previous teacher
  - *Was the student like this last year?*
  - *Does the previous teacher know of any particular problem?*
  - *Did the previous teacher have any particular way of dealing with the problem?*

- Discuss the problem with the student (without embarrassing the student)
  - *Why are you unhappy at school?*
  - *Is there a reason why you find the work difficult?*
  - *Do you have any trouble hearing? Do your ears hurt?*
  - *Do your eyes hurt? Do you have any trouble seeing? Do your eyes get tired?*

The teacher can also try some other simple steps, like trying out different positions in the classroom for the child, placing the student with a different group of students, placing the student with another student who is helpful and kind.

If nothing obvious is found in the teacher’s initial investigation, the teacher should take further steps. The teacher should check the following areas of need: hearing, vision and learning difficulties. The teacher might need to check all three areas but, in most cases, the teacher will suspect that the student’s problem lies in one particular area. The teacher should screen for hearing problems first, vision problems next, and learning difficulties after that. *A simple form to assist teachers to record screening results is provided on page 13.*
Practical activity

In groups of four, conduct the hearing test on two group members and the vision test on the other two members. Design a brief form to record your findings. Describe the process you used and show the record form to one other group.

Screening for Areas of Specific Need

Hearing

Students with mild hearing loss have difficulty hearing very soft voices and some of the softer sounds in a normal voice. Mild hearing loss is a very common condition in Papua New Guinea. It is usually caused by ear infections or chronic conditions such as glue ear (otitis media). Sometimes mild hearing loss is only temporary, occurring only while the child has an ear infection or a cold. However, ear infections often lead to permanent damage to the ear, and permanent hearing loss. Teachers should always be aware that a child with a mild hearing loss can develop a moderate or severe hearing loss if they have further ear infections, or they injure their ears. Students with itchy or uncomfortable ears can sometimes try to unblock or scratch their ears with sticks or pencils. This is very dangerous and can severely damage the eardrum, leading to more severe hearing loss.

To check a student’s hearing:

1. Select 5 different objects that the student is familiar with (e.g., cup, banana, kaukau, stone, spoon, bag etc.) and spread them out in front of the child.

2. Stand directly behind the student and then take one big step back and a big step to the right. Stand or squat so that your head is at about the same level as the student’s head. Now you are ready to test the right ear.

3. Say in a normal voice “touch the cup”, then “touch the stone” etc. Make sure that you are using a language that the student understands well!
4. Take note of whether the student hesitates or doesn’t respond correctly at all. If the student seems unsure of what to touch or when to respond, there is a possibility that the student has a mild or moderate loss of hearing in the right ear.

5. Now take two steps to the left and ask the student to touch each object again. This step tests the left ear.

6. Take note of the student’s responses again. If the student hesitates or doesn’t respond, there is a possibility that the student has a mild or moderate loss of hearing in the left ear.

7. If you suspect that the student has a significant hearing loss (mild – moderate), discuss your findings with the student’s parents and the school principal, and ask the principal to ask the nearest special education resource centre to conduct a proper hearing assessment.

If the student seems unable to pass the hearing test, check that the problem is not simply that you have a quiet voice. If you do, try the test again with a slightly raised voice. If you do not have a particularly quiet voice, and the student cannot pass the test, the student may have a significant hearing loss. Try the test again using a raised voice to see if the student has a very serious hearing loss.

If the student seems to pass the hearing screening test but you are still concerned about their hearing, try the test again with a softer voice. The student might have a very mild hearing impairment and the test will show which ear is better. Place the student near the front of the classroom if you suspect any hearing loss and place the student where their better ear is ‘facing’ the centre of the room.

**Vision**

Check students for signs of vision impairment. Typical signs are:

- frequent blinking
- squinting
- red, sore, watery, or swollen eyes
- tiredness or headaches
- holding books close to the face
- holding books well away from the face
- difficulty with reading and interpreting pictures or diagrams
- difficulty catching a ball, or clumsiness
- student complains about not being able to see clearly
- sensitivity to light

Any student who seems to have problems with vision should be referred to a doctor or clinic. However, sometimes students are not aware that they actually have a vision impairment. The following test can be used by a teacher to check a student’s eyesight if the teacher suspects that there could be a vision impairment:
1. Obtain an *E chart* for testing vision. Special education resource centres have E charts and an E chart is provided on the next pages.

2. Ask the student to sit or stand comfortably.

3. Go through the steps of the test close to the student so that they know what to do.

4. Take 6 steps back from the student and show the chart to the student. Make sure that they can see the chart clearly.

5. Ask the student to cover one eye.

6. Point to the very large E and ask the student to point in the same direction that the 'bars' of the E are pointing. You may need to demonstrate this to the student the first time.

7. Point to all of the Es, starting with the large ones and finishing with the small ones. Ask the student to point in the same direction as the bars of each E.

8. Repeat steps 6 and 7 with the other eye covered.

If the student has difficulty with any of the Es, the student might have a vision impairment. The teacher should discuss these findings with the students’ parents and the school principal, and make sure that the student is assessed by a doctor or eye clinic. The nearest special education resource centre may also be asked for assistance with more detailed eye testing.

**Class discussion**

What is the purpose of screening?
Which students would a teacher give screening tests to?
When, how and where would the teacher conduct the tests?
What should the teacher do with the findings from the tests?
Who should be involved?
**Research and practical activity**

In the school-based case study, working in pairs, conduct the hearing and vision tests on two school students that the teacher is concerned about. Ask the teacher to also complete a learning difficulties checklist for the two school students.

Report your findings.

How could this information be used to help the school students?

Who should the teacher discuss the findings with?

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**Learning Difficulties**

There is no simple test for learning difficulties that is easy for a teacher to obtain or use and that covers the many aspects of learning difficulties. If a student is in good health, does not have a hearing impairment or a vision impairment but is struggling significantly with schoolwork, or some important part of schoolwork (e.g., language, reading, or mathematics), the student may have learning difficulties. If the student struggles in most areas of schoolwork, and takes much longer to learn things than all of the other students in the class, then it is possible that the student could have an intellectual disability. If severe learning difficulties or intellectual disability are suspected, the teacher should discuss the situation with the student’s parents and the principal, and also ensure that the student is assessed by a teacher from the nearest special education resource centre.

Students with learning difficulties are often embarrassed about the difficulties that they are having, and may not ask the teacher for help. They will often avoid answering or asking questions and may be quite skilful at hiding their problems. Teachers always need to be on the lookout for students who are struggling because of learning difficulties. The checklist below is a useful guide for teachers (Adapted from *Special Education Teachers Resource Book*, PNG Department of Education, 1998, Appendix VI).

**Further Reading**


Hearing and Vision Screening

Name
Date
Date of birth
Gender (M/F)

Home address

School
Teacher

Vision Screen Results (E Test)

Eye
Result
Notes

<table>
<thead>
<tr>
<th>Eye</th>
<th>Normal Voice</th>
<th>Raised Voice</th>
<th>Quieter Voice</th>
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<tr>
<td></td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
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Recommendations

Hearing Screen Results (Voice Behind Test)

Ear
Normal Voice
Raised Voice
Quieter Voice

<table>
<thead>
<tr>
<th>Ear</th>
<th>1 2 3 4 5</th>
<th>1 2 3 4 5</th>
<th>1 2 3 4 5</th>
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</thead>
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<tr>
<td>Left</td>
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</tbody>
</table>

For each voice level, the student is asked to follow five instructions e.g., ‘Touch the cup’. Circle the number of each instruction responded to correctly. If you are sure that the student understands the instructions but responds correctly to less than 4/5 of the instructions in the ‘voice behind’ test, then the student may have a hearing impairment.

Recommendations
E Chart Vision Test Part 1
E Chart Vision Test Part 2
### Learning Difficulties Checklist

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor concentration</td>
<td>Has difficulty with key skills, such as times tables, sight words, number facts</td>
<td></td>
</tr>
<tr>
<td>Reverses letters when spelling e.g., p/g, b/d, 12/21 etc.</td>
<td>Behaves like a younger child</td>
<td></td>
</tr>
<tr>
<td>Has difficulty with reading</td>
<td>Does not like school or is not interested in school</td>
<td></td>
</tr>
<tr>
<td>Does not like reading</td>
<td>Has difficulty copying (misses words or lines)</td>
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<tr>
<td>Cannot keep up with the other students in class</td>
<td>Is clumsy or uncoordinated</td>
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<tr>
<td>Learns new things slowly</td>
<td>Speaks loudly or suddenly</td>
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<tr>
<td>Has difficulty making friends</td>
<td>Gets frustrated easily</td>
<td></td>
</tr>
<tr>
<td>Often forgets things or is disorganized</td>
<td>Gets angry easily and often</td>
<td></td>
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<tr>
<td>Has difficulty with phonics (<em>the sounds of letters and letter combinations</em>)</td>
<td>Disturbs other students in class</td>
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</tr>
</tbody>
</table>

*If four boxes are ticked for a student, the student may have learning difficulties*
Module 2  Inclusive Special Education

Topic 2:  Individualized Planning

Planned hours:  2 lectures (1 hour presentation; 1 hour student activities)
1-2 hours student research & study

Introduction
Special education is the design and delivery of teaching and learning strategies for individuals with disabilities or learning difficulties. In most cases, students with disabilities do not require an individual (or separate) learning curriculum. Rather, most students simply need some adaptations to be made to the regular school curriculum that other students receive. Individualized planning is the process of identifying any modifications to the curriculum that an individual student may need, and working out how those modifications can be implemented.

What will students learn in this topic?
- Students will examine the purposes of individualized planning in special education
- Students will explore an individualized planning process
- Students will explore collaborative planning procedures
- Students will relate individualized planning to regular classroom planning and teaching

How is Individualized Planning linked to other topics in Module 2 – Inclusive Special Education?
Module 2 describes the practical activities that make up inclusive education. Topic 2 Individualized planning introduces the formal process of deciding what will be taught to the student with a disability and how it will be taught. Individualized planning is an important part of the program cycle in which effective teachers continually plan, teach, observe and plan again.

Class discussion
How does a teacher decide what special instruction and activities to use with students with special learning needs in a regular class?
When does a teacher decide what to teach and how to teach it?

Rationale
What is the role of individualized planning in effective teaching?
A teacher is much more likely to be effective when they know what students need to be taught, how the students can be taught and what preparations need to be made for that teaching to proceed. Effective teachers plan their teaching in advance. Effective teachers use individualized planning procedures for those students who need extra or special assistance and modifications to the curriculum. In this way, effective teachers make sure that their planning caters for all their students. They have an overall class plan (teaching program) that caters for most students, and some individualized plans to make sure that students with special needs also receive the teaching that they need.
Description

**What is individualized planning?**
Individualized planning is a process that produces an individualized plan for a student with special educational needs. The teacher uses the individualized plan to implement any special teaching procedures that a student with special educational needs may require. In developing an individualized plan, the teacher needs to consider:
- What can the student already do?
- What does the student need?
- What can be provided for this student?
- When will the target outcomes be achieved?

**Tekla’s IP**

Tekla is in her fourth year at school. Tekla likes school and she likes her teacher, Mr Akalitz, very much. When Tekla started the year in Mr Akalitz’s class, Mr Akalitz knew that Tekla would have difficulties because Tekla’s previous teacher had told him that Tekla was a very poor reader and that she needed special help with some of her schoolwork. When Mr Akalitz found out that Tekla would struggle with reading, he decided that he’d better find out what Tekla could already do.

The first thing he did was ask Tekla’s previous teacher what sort of books Tekla could read, and what reading skills she already had. He then took Tekla aside in class and asked her to read from some books. He chose a very easy book (Grade 1 level), a fairly easy book (Grade 2) and a book that he thought Tekla might find a bit hard (Grade 3). Mr Akalitz worked out with Tekla that she was reading at about a Grade 1 level. He also found out that Tekla struggled with some sight words and had very poor phonics skills. Mr Akalitz had also begun noticing that Tekla was having difficulty with mathematics and some other curriculum areas. He decided that this was probably because Tekla was having trouble reading maths instructions and other written instructions. Mr Akalitz decided that he’d better work out a way to teach Tekla the skills she needed most as soon as possible.

Mr Akalitz consulted the principal of the school, Tekla’s previous teacher and Tekla’s parents. He wanted to find out what they thought were the most important skills for Tekla to learn. Mr Akalitz knew that he would only have time to teach Tekla some of the many skills she needed to learn, so he wanted to concentrate on the most important ones.

Mr Akalitz also discussed what could be done to help Tekla with the principal and Tekla’s parents. Everyone agreed that reading, especially phonics (and other decoding skills), should be Tekla’s top priority outcome. The principal offered to contact the special education resource centre and find out if they could suggest any special materials or techniques. Tekla’s parents said that they would be able to read with Tekla each day (although they couldn’t read very well either) and ask Tekla to tell them all about what she read at school each day.

Mr Akalitz worked out that he could prepare some phonics practice cards for Tekla and that he would spend 10 minutes each day listening to Tekla read and
practicing her phonics skills and sight words. He also asked another student who was helpful and kind to help Tekla with written instructions in mathematics. The other student’s parents were very proud that their daughter had been chosen for such an important task! Mr Akalitz said to the principal “No one has much time to help Tekla and the other students who struggle but, because several people are giving Tekla just a few minutes of help each day, she’s getting quite a lot of help!”

The special education resource centre staff were able to give Mr Akalitz some good ideas on how to choose suitable reading materials for Tekla. They suggested that he ask Tekla about her interests and find some easy books about those things. Mr Akalitz soon had a few books from the library that were interesting for Tekla, and he continued to use the cards and some worksheets that he had made up for Tekla and some other students. He found that he didn’t really need many resources for Tekla. Some days he just wrote one or two sentences on paper for Tekla, using some words that he knew Tekla already knew and ones that she needed to learn.

In the discussions with the principal and Tekla’s parents, everyone decided that Tekla’s main goals for the year would be to build up a sight word vocabulary of 100 words, to learn all the single letter sounds (she knew many of them already) and to sound out simple consonant/vowel blends (ta, pi, etc.). They decided to review Tekla’s progress half way through the year.

Tekla is happy with her progress. She’s getting lots of help and she can see that she’s learning. Mr Akalitz is happy because he has a target to aim for with Tekla and he’s confident that it will be achieved because his planning was very good and his approach is organized.

Individualized planning (often called individualized educational planning (IEP)) can be a very formal process. In American and Australian textbooks, for example, the IEP process is usually described as a series of formal meetings involving teachers, therapists, parents, school psychologists and any other professionals who may be working with the particular student. There are two reasons why the process described in these textbooks is so formal. Firstly, America, Australia and many other developed countries have extensive services for children with special educational needs, so there often are several professionals working with each child for some of the time. Secondly, those countries have financial grants that are given to schools so that schools may employ teachers’ aides to help the teacher work with the child. Formal IEP meetings have to be held so that a submission to the government can be developed. It should be noted that schools, teachers and parents do not always find these formal processes helpful, complaining that the meetings and form filling requirements are time-consuming and not always very productive. Many teachers and parents prefer a less formal process, involving fewer people to make decisions about the child’s education.

In Papua New Guinea, like most other developing countries, schools do not have access to therapists, psychologists or other health professionals to assist with or advise about students with special educational needs, and PNG does not have a system of financial grants to schools for students with disabilities. Nevertheless, schools can call upon assistance from their special education resource centre in many areas, and schools
should involve parents in individualized planning for students with special needs. Some schools have a team of two or three teachers who form a school-based learning support team, and these teachers are available in the school to help other teachers work out plans and provisions for students with special needs. Many provincial education offices are currently sponsoring teachers to attend extensive special education training courses so that, over time, many schools will have at least one member of their staff trained in special education. This is an excellent way of encouraging schools to establish learning support teams.

Individualized planning does not need to be a formal process. It can be quite informal, as in the example of Tekla’s Individualized Plan above. When a teacher finds that a student might need special assistance, the basic steps of individualized planning are:

1. **Assessment**
   
   *What can the student already do?*
   
   *What does the student need?*
   
   Finding out what the student can do and what they need involves talking to any previous teachers, the student’s parents, and anyone else who might have worked with the student. The student might already be involved with the special education resource centre or a health clinic. If so, the teacher should also ask them about what the student can do and what the student needs. Screening or other more formal assessment activities are also an important part of the process. Sometimes the teacher, with the parents, may need to refer the student to a clinic or the special education resource centre for assessment.

2. **Planning**
   
   *What can be provided for this student?*
   
   *When can it be provided?*
   
   *Who can provide it?*
   
   Planning is the process of deciding what can be done to assist the student and when. It is important that this process involves the teacher, the student’s parents and anyone else who may be able to offer ideas or practical assistance (e.g., school learning support team members, special education resource centre personnel). These people form a **planning team** for the student.

   The planning team will often find that the student needs more than the teacher or school can really provide. This should not be a problem. The planning team must decide which needs are the most important and give priority to those. The team should give priority to those skills that will benefit the student the most and that can actually be achieved. The team should also work out with the teacher, how much assistance can be given, when it can be given, and who it can be given by. As in the example of Tekla, above, a small amount of input from a number of different people, can amount to quite a lot of individual assistance.

   The most important part of the planning process is selection of target outcomes. From the priorities selected, the teacher (or the team) has to select specific educational outcomes that will be targeted for instruction. These are called **target outcomes** (or targeted outcomes, or educational objectives). The number selected should be small and they should all be achievable within a set timeframe, e.g., one school term. Target outcomes should state exactly what it is intended the student will achieve, e.g.:
• **Tekla recognizes all consonant/vowel blends with ’a’ and ’I’**
• **Tekla reads a Grade 1 book with no more than 2 errors per page**
• **Tekla writes her name and address correctly**

Another very important part of the planning process is working out what sort of instructional methods and materials need to be used. This is most often done by the teacher alone, but it works much better if the teacher is assisted by another teacher, such as a member of the school learning support team. Teachers can also work with a teacher from the special education resource centre.

Peer tutors (other students in the class acting as helpers or tutors), are a very valuable resource for teachers to call upon. Parents are proud when their child is selected to be a peer tutor and being a tutor can actually help the tutor to learn along with the student being helped.

3. **Setting a timeframe**  
   *When will the target outcomes be achieved?*
   *When will progress be reviewed?*

It is important in individualized planning to set a timeframe within which the target outcomes are expected to be achieved. Setting a timeframe helps the teacher organize time well and also helps in checking whether progress is really being made. In a large class, it is easy for a teacher to lose track of students’ progress. When timeframes are set in an individualized plan, the teacher can compare observe the student’s work and check the progress against the stated target outcomes and the set timeframe. The team also sets a date to review the student’s progress and to set new target outcomes. This is how individualized planning becomes an ongoing cycle of planning, implementing, observing and then more planning, and so on.

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**Practical activity**

In groups of four students, using the form below, write an individualized plan for Tekla. Make sure that you choose outcomes that are achievable within no more than one or two school terms, based on the information you have about Tekla.

**Research and practical activity**

In the school-based case study, develop an individual plan for the student you are working with. Make sure that you describe the actions you will take for the student to achieve each outcome.

Teachers will find individualized planning easier if they use a standard format. A form that can be used for individualized planning is provided at the end of this topic. A sample scenario is provided below and a sample planning form is provided on the next page. Study them to see how planning is drawn from specific needs and input from different people.
Samia

Samia is in his third year at school. Samia was doing quite well at school until he fell into a fire during a celebration in his village, nine months ago. Samia suffered severe burns to his right side, and his right arm was so badly burnt that he now has very limited use of his right arm and right hand, and he has difficulty walking due to damage to his right knee, ankle and foot. Samia was given assistance with rehabilitation, which has helped him with mobility and some use of his right arm but he continues to be unable to write with his right hand and the physiotherapist has indicated that it is unlikely that he will ever be able to use his right hand for writing or other fine motor activities.

Samia keeps trying to use his right hand for writing because he feels very awkward using his left hand. He is also reluctant to try to walk as he feels embarrassed by his awkward walking and his left leg becomes very sore after a short time. Samia is depressed because of the many things that he now has difficulty with and his injuries still cause him severe pain from time to time.

Samia’s teacher has arranged an individual planning meeting with Samia’s parents and his clinic nurse to work out what educational priorities to set for Samia and to make sure that everyone involved with Samia agrees on what his program should be.

Further Reading


**Individual Plan**

**Name**  
Samia S.

**Date of birth**  
2 August 1993

**Gender (M/F)**  
M

**Home address**  
East Village Mt Hagen  
WHP

**School**  
East Mt Hagen PS

**Teacher**  
Ms K.

**Assessment**  
**Description of special educational or other needs**

Following severe burns to Samia’s right side, he is unable to use his preferred hand for writing, so he needs to transfer to his left. His walking is also affected so he needs assistant with movement around the school. Samia is depressed and embarrassed by his disability following his accident. Samia’s priorities are:

i. writing fluently with his left hand, using his right hand for support only

ii. practice in lifting right foot and using body to ‘swing’ right foot forward when walking

iii. building Samia’s self-esteem

**Individual Plan**

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<tr>
<th>Target outcomes</th>
<th>By when</th>
<th>Action</th>
<th>Personnel</th>
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<tbody>
<tr>
<td>Form all letters correctly using left hand only</td>
<td>End T2</td>
<td>5 minutes teacher support each day; general teacher support as well</td>
<td>Teacher</td>
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<tr>
<td>Walk independently for 2 minutes</td>
<td>End T3</td>
<td>Walking practice with friend 3 times each day; 4 minutes each</td>
<td>John M.</td>
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<tr>
<td>Express positive views about own ability</td>
<td>End T3</td>
<td>Teacher encouragement; parents’ encouragement</td>
<td>Teacher</td>
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**Any other action to be taken**

Samia permitted to participate in all physical activities but not to be assessed or required to participate if he is unwilling

**Next review date**  
End Term 2

**Members of planning team**  
Ms K, Mr & Mrs S., Mrs P (clinic nurse)
### Individual Plan

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#### Assessment

*Description of special educational or other needs*

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#### Any other action to be taken

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Module 2  
Inclusive Special Education

Topic 3:  
Task Analysis

Planned hours:  
2 lectures (1 hour presentation; 1 hour student activities)  
1-2 hours student research & study

Introduction
Special education is a process of making adaptations and alterations to educational procedures, materials, equipment and facilities to accommodate the special educational needs of some students. The process of altering curriculum and instruction is, by far, the greater part. The kinds of adaptations that teachers make to their instruction and to students’ curriculum varies from individual to individual, according to the particular needs of each individual. Effective teachers use task analysis to systematically determine what steps a student must perform to complete a particular learning task and the ways and sequence in which those steps could be taught to that student.

What will students learn in this topic?
- Students will understand the concept of task analysis
- Students will learn the process of task analysis and its role in effective instruction and assessment
- Students will explore a variety of applications of task analysis
- Students will explore ways of sequencing their teaching through task analysis

How is Task Analysis linked to other topics in Module 2 – Inclusive Special Education?
Curriculum outcomes (or learning tasks or objectives) are identified through a student’s individual educational planning (IEP) process (Topic 2). In Task Analysis the curriculum outcomes identified are broken down into parts for instruction. The Task Analysis topic is also linked to Topic 7: Adapting the Curriculum, as curriculum adaptation usually involves task analysis. For example, standard curriculum outcomes can be broken into ‘smaller’, or ‘component’ parts for a student with an intellectual disability, or a standard curriculum outcome might be task analyzed to identify components that may need to be altered for a student with a visual impairment.

Rationale
What is the role of task analysis in effective teaching?
If we define special education as all of the special alterations we make to education and instruction to accommodate special educational needs, then task analysis is a fundamental component of special education. Special education almost always involves making decisions about how a student with special educational needs will learn and perform a procedure or other activity. Task analysis assists teachers to undertake this process in a systematic and effective manner.

(The) decision making of expert teachers is (always) based, in part, on the process of task analysis  (Berliner, 1989).
Description

What is task analysis?

Task analysis is the process of breaking down something to be learned (e.g., a procedure, a skill, an activity, an objective) into teachable parts (Westwood, 1997). The degree to which the task is broken down, and the way it is broken down, depends upon the complexity or difficulty of the task, and the capability of the learner. In practice, task analysis generally refers not only to the process of breaking a task into teachable parts but also to the manner and sequence in which the task and its component parts are then taught. Task analysis is particularly useful when teaching procedures or strategies, and is usually used for this purpose. It is also an effective curriculum-based assessment technique when a curriculum outcome is broken down into its component parts for assessment purposes (Arthur, 2001, p. 152).

The demands of a particular task depend on the capability of the student, so task analysis varies from student to student. Consequently, task analysis is usually an individualized process.

Research

Check all references to task analysis in two separate special education textbooks. Provide a short summary of the types and purposes of task analysis described in each textbook.

What are some examples of task analysis?

Consider the following examples:

**Parau**

**Drawing a 4cm x 6cm Rectangle**

1. Draw a 4cm line across the page
2. Use a set square to measure a 90 degree angle down from the end of the line
3. Draw a 6cm line at 90 degrees down from the end of the 4cm line
4. Draw a 6cm line at 90 degrees down from the other end of the 4cm line
5. Join the free ends of the two 6cm lines to form a rectangle

**Maro**

**Drawing a 4cm x 6cm Rectangle**

1. Place 2 pins 4cm apart across the soft board
2. Use a set square to measure a 90 degree angle down from one pin
3. Place a third pin at 90 degrees and 6cm down from the first pin
4. Place a fourth pin at 90 degrees and 6cm down from the second pin
5. Glue string around the four pins to form a rectangle
6. Remove the pins
Aitiria

Drawing a 4cm x 6cm Rectangle

1. Select a clean sheet of paper and a sharp pencil
2. Get a ruler and a set square
3. Place the ruler across the paper
4. Draw a line on the paper from the 0 on the ruler to the 4
5. Remove the ruler
6. Use the set square to make a square corner down from the left hand end of the line
7. Draw a short line down to make a corner on the paper
8. Use the set square to make a square corner down from the right hand end of the first line
9. Draw a short line down to make another corner on the paper
10. Place the ruler so that the 0 is on the left hand corner of the first line and the ruler follows the short line down
11. Make the short line go all the way to 6 on the ruler
12. Place the ruler on the right hand corner so that the 0 is on the corner and the ruler follows the short line down
13. Make the short line go all the way to 6 on the ruler
14. Place the ruler so that it goes between the two line ends
15. Draw a line between the two line ends to form a rectangle

The teacher, let’s call her Miss Pokana, is very conscientious, and has developed separate task analyses to help her to teach three of her students with special needs to draw rectangles. Although the task is the same for all students, the task analyses are different because the students have different needs. Miss Pokana has developed a task analysis for Parau because Parau has some learning difficulties and needs learning tasks to be stepped out very clearly. The task analysis for Parau is similar to the instructions Miss Pokana gave the rest of her 35 students but Miss Pokana used task analysis to make sure that she included very specific instructions for Parau. Most of the other students in the class could already draw rectangles and just needed the dimensions and a reminder to use a setsquare and ruler carefully.

Miss Pokana developed a very different task analysis for Maro because Maro is blind. Miss Pokana worked out with Maro and Maro’s parents that Maro could ‘draw’ shapes and pictures using string and glue. Miss Pokana (being very bright and conscientious!) decided to use pins to mark the corners of geometric shapes. Maro’s task analysis for rectangles will help Miss Pokana to teach the steps of drawing a rectangle using a tactile ruler, an ordinary set square, a soft board and pins.

Aitiria has a different task analysis again because Aitiria has more difficulties with learning. Aitiria might have a mild intellectual disability, although no one is quite sure. In any case, Miss Pokana has constructed a task analysis to help her teach Aitiria, and Miss Pokana knows that she will need to use very clear instructions and to describe each small step in the rectangle drawing procedure.
Miss Pokana doesn’t know whether her task analyses will work or if she’s chosen the right steps to use. She’ll now try it out with the three students and adjust those parts that turn out to be not quite right. Miss Pokana knows that the most important thing is that the students are learning. She knows that it doesn’t matter if her task analyses aren’t quite right. Like all good teachers, she’ll adjust her procedures and her instruction according to the performance and progress of her students. Through task analysis, Miss Pokana is able to integrate assessment and instruction. This saves time and leads to better instructional decision-making.

Here’s another example of a task analysis. Task analysis is frequently used to teach self-care skills (or independent living skills) to students with intellectual disabilities:

**Self-care skill: Putting on a sock**
1. Child sits with knee raised
2. Child picks up sock
3. Child finds open end of sock
4. Child checks that the heel of sock is down
5. Child slides toes into open end of sock while enlarging sock opening with hands
6. Child pulls sock over heel
7. Child pulls sock up to full height

*Adapted from Westwood (1997: p. 197)*

**What are the ways that task analysis works in practice?**
All kinds of skills and procedures can be taught through task analysis: academic skills, sports, use of equipment, preparing for schoolwork, self-care skills, and so on. In fact, we see sets of instructions that look like task analysis all the time, for example:

- recipes
- equipment manuals
- maths textbooks
- science experiments
- guides

The difference between a task analysis and a set of instructions (or a recipe) is that a task analysis examines both the task and the learner, not just the task itself. To conduct a task analysis, the teacher asks this question: *What is involved in this student successfully completing that task (or demonstrating that skill)?> (Arthur, 2001. p. 152).

A good teacher is conducting task analysis all the time, as they teach. Most of these task analyses are not written down. They’re simply a mental guide for the teacher’s thinking process as the teacher plans and implements instruction. However, a more formal task analysis is used when the teacher knows that a student is likely to have significant difficulty with an important learning activity. It is most likely that the activity will have been specified in the student’s *individual educational plan* (IEP). When this is the case, the teacher usually performs the following procedures:
The Process of Task Analysis

Preparation
1. Perform the task and note down all the steps. It is particularly important to include any cognitive activities as well as physical actions in the task.

2. Consider the student's particular needs and add any extra steps or special steps that the student is likely to need to perform the task i.e., what is involved in this student successfully completing this task?

3. Consider any prerequisite skills and knowledge. Are there parts of the task that the student should learn beforehand or that will need extra attention or training?

Assessment
4. Try out the task analysis by asking the student to perform the task, and assess the student's performance on each step. Note the student's performance and adjust the task analysis in preparation for teaching with it.

5. Draw up a record form to record the student's progress on the task. The form could contain a daily or weekly record, according to how often the student attempts the task. Some tasks can be performed on many occasions on one day, so teachers often design forms to record the student's performance on several occasions on each day.

Implementation
6. Decide how to teach the steps of the task, which steps to concentrate on and what materials may be needed. (Some tasks are best taught backwards! Backward chaining and forward chaining are discussed below.).

7. Implement the task analysis, teaching the targeted steps in the sequence decided upon, and keeping a record of progress. This usually involves the teacher allowing the student to independently perform all steps that the student can already perform but helping or prompting the student through the steps that the student cannot perform, or is still learning.

8. Continue implementation of the task analysis, adjusting teaching according to the progress of the student’s performance, until an acceptable level of independence is achieved.

Classroom activity
With a partner, construct a task analysis of buying a packet of biscuits from a trade store. When your task analysis is complete, adapt it for a student who is deaf and for another student who is unable to walk independently.

Classroom activity
In groups of four, construct a task analysis of looking up the meaning of a word in a dictionary, for a student with an intellectual disability. Don’t forget to include any cognitive steps and decisions. Design a simple data collection form to record the student’s daily progress.
This is a typical example of a data collection form to record a student’s progress. The teacher has designed it for a student who has difficulty with personal organization (a common problem for students with learning difficulties). The teacher checks the student’s performance three times each week. The teacher has decided on three levels of performance to record. They are ‘Independent’, meaning the student performed the step without teacher prompting, ‘Prompt needed’, meaning that the teacher needed to remind the student, and ‘Teacher assistance needed’, meaning that the teacher (or perhaps a peer) needed to help the student with that step. Note that this student was able to perform some steps of the task right away and that his performance by the middle of the third week is much better than it was in the first week.

By just looking at the data sheet, the teacher can see clearly that the student’s progress on most steps is quite good and that soon the teacher will only need to concentrate on the student’s ability to work without disturbing others and arranging his work materials. Because a systematic, task analysis approach has been taken for this task, the teacher can see that her teaching is working and that she can set more specific targets. Without this approach and the data, the teacher might easily think that the student is not making good progress and that her teaching is not working well.
Sequencing

Procedures and activities are nearly always a sequence of steps. They usually have a first step and a last step, and other steps in-between. Teachers nearly always teach procedures by teaching the first step first and then the next step, and then the next, and so on. This process can be thought of as forward chaining, because the steps are linked together like a chain and the steps are taught in a forward sequence. Sometimes, however, teaching in a forward sequence is not as effective as teaching in a different sequence.

When students perform tasks, there is usually an outcome. If the task is, for example, finding a word in a dictionary, the outcome is the found word. If the student is completing a mathematics algorithm, the outcome is the completed algorithm. If the student is putting on a sock, the outcome is that the sock is on the foot. Students usually gain satisfaction from completing such tasks. They like to see what they have achieved. For this reason, when a teacher is teaching a student who is struggling to learn the task, the teacher can sometimes help the student to learn by allowing the student to finish off the task independently. In other words, the teacher lets the student finish off as much of the task as the student can do, instead of letting the student start it off and only helping when the student fails. This method of teaching is called back chaining (see Westwood, 1997, p.197). Back chaining is a powerful teaching method because it prevents failure, teaches by prompting and helping, and the student has the satisfaction of seeing the result of their efforts immediately.

Research

Identify five skills that might be taught best using a back chaining approach. Explain why you believe this method would be best for these skills.

Another method of teaching using task analysis is called jump-in-the-middle chaining. In this method, the student performs as many steps of the task as they can independently and the teacher helps or prompts on the steps that the student struggles with. Benson’s data form (see below) is an example of a teacher using jump-in-the-middle chaining. Jump-in-the-middle chaining is really just a fancy name for what teachers do naturally most of the time! However, when teachers implement and monitor this approach systematically through task analysis, they are able to gauge the effects of their teaching, and adjust their teaching, much more effectively.

Using pictures

Another very effective way of using task analysis is to construct a task analysis with pictures or photographs. The teacher places a picture of each task analysis step in a booklet or in order on a card. The student then uses the series of pictures to prompt them through the task.

Classroom activity

In groups of four, construct a simple pictorial task analysis of a sports activity of your choice for a student with a disability. Design a simple data collection form to record weekly progress.
Generally speaking, task analysis is a very useful teaching tool that can be used in many different ways to assist teachers and students. Teachers are encouraged to work out different uses for this powerful teaching tool and different ways of applying it.

Task analysis as a planning tool

Task analysis can be used to guide initial planning, e.g., Samia (the student used as an example in Topic 2: Individualized Planning had to have an individual plan developed for him. Samia’s teacher, nurse and parents analysed the major educational tasks that they felt were appropriate for Samia, that is, writing, walking and thinking positively. In effect, they actually performed a kind of task analysis on the primary curriculum. Their very general task analysis revealed the parts of those skill areas that Samia (i) needs, and (ii) can achieve with good teaching. Their task analysis also revealed what adaptations Samia would need, if he is to learn to perform the tasks independently.

Samia’s teacher’s next step, following individualised planning, is to perform a finer task analysis on the specific skills that the general task analysis showed were needed. Samia’s teacher needs to task analyse each of Samia’s target outcomes, that is ‘form all letters correctly using left hand only’ (one task of the many tasks that make up independent writing), ‘walk independently for 2 minutes’ (walking for 2 minutes is just one part of full, independent walking) and ‘express positive views about own ability’ (There are many tasks in the general skill of having positive self-esteem). Here’s an example of a fine task analysis of one of Samia’s target outcomes (Samia’s teacher is starting Samia’s program by having him form his own name correctly; after that, she will teach him to write the easier letters (the one’s that Samia finds easiest) and move on to the more difficult ones (the ones that Samia has more trouble with):

**Form all letters correctly using left hand – own name**

1. Grip pencil with left hand using proper grip
2. Rest right hand on desk
3. Place pencil at correct place to write ‘S’
4. Form an ‘S’
5. Place pencil at correct place to write ‘a’
6. Form an ‘a’
7. Place pencil at correct place to write an ‘m’
8. Form an ‘m’
9. Place pencil at correct place to write an ‘i’
10. Form an ‘i’
11. Place ‘i’ dot in the correct spot
12. Form an ‘a’

Samia’s teacher monitors his performance daily and keeps a simple record of his progress. After two weeks, Samia’s chart looks like this:
Grip pencil with left hand using proper grip

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Rest right hand on desk

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Place pencil at correct place to write ‘S’

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What patterns are emerging? Samia’s data shows the teacher what’s happening, over time. The teacher can use this data, after a reasonable period of time, to make changes to Samia’s plan. In this way, planning becomes a cycle of implementation, evaluation and ongoing planning.

**Practical activity**

In the school-based case study, incorporate task analysis, sequencing of instruction and recording progress. Demonstrate how they have used task analysis for ongoing assessment and to guide their instruction.

**References**


Module 2  Inclusive Special Education

Topic 4:  Utilizing Aids

Planned hours:  2 lectures (1 hour presentation; 1 hour student activities
1 hour student research & study

Introduction
Aids are the materials and devices that teachers use to assist them in their teaching. In special education, this also includes equipment that is used to assist students with mobility, independence and general improvements in quality of life.

There are many resource materials in the schools and communities of Papua New Guinea that people have been using to manufacture assistive devices for many years. These resources are usually readily available and cost free. While some students in PNG have access to expensive wheelchairs and special orthopaedic equipment, many do not, so this topic also includes information about aids that can be manufactured at low cost from natural or readily available materials.

What will students learn in this topic?
- Students will examine the use of aids in special educational classroom applications
- Students will examine the use of aids for students with disabilities
- Students will explore ways of manufacturing or obtaining aids

How is Utilizing Aids linked to other topics in Module 2 – Inclusive Special Education?
Module 2 focuses on methods of planning and providing individualized assistance to students with special educational needs. In supporting individuals, teachers in PNG are often called upon to provide aids to reduce the impact of disability and to assist in the effectiveness of their teaching.

Class discussion
What sort of teaching aids do regular classroom teachers use? Where do they come from? What sort of aids to teachers make? Do teachers share their equipment?

Rationale
What are the roles of aids in effective teaching?
Teachers in Papua New Guinea have a responsibility to ensure that they provide the most effective education that they can to students with special educational needs. For many students, this involves adapting learning materials and developing special learning materials. These adaptations and special materials are special teaching aids. Many students also need assistance if they are to access school at all; they may need assistance with personal mobility due to a physical disability or they may need large print materials or glasses due to a vision impairment. Although teachers cannot always provide the aids that some students need, they often can, and they can usually seek
assistance from their school, students’ parents, the local community or the nearest special education resource centre. Effective teachers utilize effective learning aids and they take steps to ensure that their receive whatever aids are available to assist them to gain access to quality education.

**Description**

**What are aids?**

Teachers in Papua New Guinea can be involved with two general types of aids; teaching aids, which are materials and equipment that help them to be more effective teachers, and rehabilitation aids, which are items of equipment that reduce the effects of a student’s disability.

**Teaching Aids**

The variety of special equipment and materials that teachers use to assist students with disabilities is vast. It ranges from very simple materials, such as adapted worksheets and sets of flashcards for students with learning difficulties, right through to special communication devices and other highly technical equipment, for some students with very severe intellectual or physical disabilities. In between, there are items such as large print materials for students with vision impairments, cassette tape recorders that can be used for many different applications (such as ‘listen as you read’ activities for students with reading difficulties), counters and markers, ‘toy money’ for students with difficulties in mathematics, printed notes for deaf students, softer or lighter balls and other sporting equipment for students with physical disabilities, and so on.

Constructing or obtaining special aids is a problem-solving activity. Teachers consider what needs to be taught and they work out how to teach it. They decide what special equipment might be necessary or desirable, and they work out how to make it or obtain it. Then they use it and adapt it if necessary. The steps for using special teaching aids are simple and well worth remembering:

**Using Special Teaching Aids**

1. **Decide what needs to be learned**
   - Teachers work this out from the student’s individualized plan or the class program

2. **Decide what is the best way to teach it**
   - This depends on the student, what is to be taught, and the practical situation

3. **Decide what aids are needed**
   - This depends on what is needed, and what available or can be obtained readily

4. **Construct or obtain aids most**
   - Teachers use whatever is simplest and easily obtainable. Teachers should not delay their teaching waiting for equipment.
5. Use the special aids and adapt as necessary

Teachers should always be prepared to change or adapt their aids and other materials to suit the task at hand.

6. Store special aids and share them

Teachers can quickly build up a good collection of useful special aids and other teaching materials that can be used over many years. Teachers who share their special aids also find that they can then use other teachers’ materials too. In this way, the work of the teacher is reduced substantially as the years pass.

Some considerations in designing or choosing special aids and other special equipment, are as follows (Werner, 1987; Westwood, 1997):

- Use materials or items that are durable, cheap and easy to obtain
- Construct aids that suit the task
- Gain assistance from community helpers or others if possible
- Make aids fun to use, if possible
- Make sure any pictures are clear and easy to interpret
- Make sure all print is clear and legible
- Use cues and prompts to assist students with learning difficulties
- Use multiple-choice materials to prompt memory
- Avoid any unnecessary detail or decorations

Here are some ideas for special teaching aids that teachers in PNG schools can either obtain or manufacture:

- Make a simple abacus to help students in mathematics
- Make a simple spelling dictionary that students can put new words in
- Make a simple notebook that students can put words in as they learn to read them
- Use empty containers to help students who are disorganized keep their materials in order
- Collect pictures from magazines so that students who cannot draw or write can make up stories from them
- Use sago wood to pin up words as students learn to read them and spell them
- Write short stories using picture prompts as well as words (make up symbols for words that you can’t make a picture of)
- Use a cassette tape recorder to make up ‘listen as you read’ tapes
- Make up playing cards with mathematics symbols or simple equations (e.g., cards with ‘3 + 4’, ’6-2’, ’1+1’ etc., to match cards with answers on them)
- Make up multiple choice comprehension worksheets
- Make up playing cards with matching words and pictures
- Keep containers of pebbles, sticks, nuts etc. to help students in mathematics
• Convert simple games to include spelling, writing, reading and mathematics skills
• Keep cooking equipment, toys and other everyday objects to use in lessons (students learn more easily with familiar, realistic materials and concepts)
• Cut up pictures and diagrams to make jigsaw puzzles for teaching mathematics and other concepts
• Make up letter tiles or cards to help with writing, spelling and reading
• Make up letter tiles or cards with letter blends
• Make a wooden clock to help teach telling the time and other mathematics skills
• Use empty containers to make up number trays (students have to put the right number of objects in each tray)
• Use soft, light balls made from rags for sports and catching games for students with disabilities
• Use a ball with a rattle in it for a blind student
• Use dominoes to teach mathematics concepts
• Make up basic shapes for students to trace

Practical Activity
Manufacture a special teaching aid or set of materials for a student with a disability. Demonstrate your aid to the class and report:
What is it?
What materials did you use?
Where did you obtain the materials?
How will your aid assist a student?
How did you make it?
Rehabilitation Aids

There are many different kinds of rehabilitation aids for students with disabilities. Some aids are very sophisticated and expensive, such as electronic speech synthesizers, electric wheelchairs and portable computers. Most families in Papua New Guinea are not able to afford such equipment, and they do not last very well in the humidity of PNG in any case. Some other equipment is not as expensive but a highly trained technician is needed to manufacture it or customize it so that it suits a particular student. Spectacles, artificial limbs and orthopaedic braces are examples of this type of equipment that can be obtained in PNG. Hearing aids are very expensive and also require a highly trained technician to modify them for an individual, but they can be obtained in PNG. Special education resource centres and local hospitals or clinics can usually advise schools or families where and how they can obtain these kinds of rehabilitation aids. Special education resource centres can also, sometimes, assist or advise families about how the funds for such equipment might be obtained.

Many of the rehabilitation aids used in PNG schools and in community-based rehabilitation programs are locally made from materials that are inexpensive and readily available. It is worth noting that these kinds of aids can often be better suited to their purpose and situation than much more expensive imported equipment (see Werner, 1987, pp. 525-532). Crutches, walking sticks, walking frames, wheelchairs, leg and arm braces, and special posture chairs and tables are commonly made in PNG communities from bush materials, cardboard, paper and glue.

Teachers and rehabilitation workers who regularly use such materials recommend that:

- Rehabilitation aids should suit the local climate and conditions (a wheelchair on a mountainside is usually not appropriate!)
- Rehabilitation aids should be inexpensive if possible
- Rehabilitation aids should be durable
- Rehabilitation aids should be attractive and acceptable to their user

The books by Werner (1998 & 1987) provide excellent descriptions of the many ways in which rehabilitation aids can be constructed cheaply from readily available materials. Whilst teachers cannot always be heavily involved in the manufacture of rehabilitation aids, teachers can provide parents and other community members with information about how aids can be made or obtained. Teachers can also collaborate with community members and special education resource centre personnel to work out what sort of rehabilitation aids might work best in the school situation and be involved in the design and construction of them.
This head protector is made from a strip of flexible plastic with foam glued to the inside.

This posture chair supports a student whose back cannot support him. The posture chairs made from layers of cardboard glued together and then covered in paper and glue (papier mache). The chair has been painted to make it attractive and easier to clean.

This student is having fun with his new ‘toy car’! It’s a walking frame that helps the student to walk as he is unable to walk without assistance. The walking frame has been made from timber scraps. It is an excellent example of a cheap, practical rehabilitation aid.

A low table made for a student who cannot sit in a chair. The table is made from layers of cardboard glued together and papier mache. The table is still in construction so it hasn’t been painted yet. The table is sitting on a pile of old cardboard boxes which will be glued together to make more rehabilitation aids and furniture. Cardboard furniture is light, cheap to make and very strong.
Research and Practical Activity

Using the references below as a guide, manufacture a rehabilitation aid for a student with a disability, using scrap materials or bush materials. Demonstrate your aid to the class and report:

- What is it?
- What materials did you use?
- Where did you obtain the materials?
- How will your aid assist a student?
- How did you make it?

References


Module 2  Inclusive Special Education

Topic 5:  Adapting the Environment

Planned hours:  2 lectures (1 hour presentation; 1 hour student activities)
1 hour student research & study

Introduction
School students have a right to expect a welcoming and suitable environment in their school and their classroom. Teachers can easily ensure that their classroom is a welcoming and suitable environment for students with disabilities and other special educational needs.

What will students learn in this topic?
- Students will explore ways of adapting a typical classroom environment to accommodate students with special educational needs

How is Adapting the Environment linked to other topics in Module 2 – Inclusive Special Education?
Module 2 focuses on methods of planning and providing individualized assistance to students with special educational needs. In supporting individuals, teachers must ensure that their classroom maximizes opportunities for students with special needs and ensures that students with disabilities can gain access to those opportunities.

Class discussion
What sort of things can make life difficult for students with disabilities in a regular classroom?
How can a teacher set up their classroom for better access by:
a student with low vision
a deaf student
a student with severe behavioural problems
a student who uses a walking frame for mobility
a student who cannot use a regular chair?

Rationale
Why do effective teachers adapt the environment to accommodate students with special needs?
Students will not learn effectively in a classroom that is not welcoming or accessible. Effective teachers take responsibility for all of their students so they make sure that their classroom is accessible and welcoming. Effective teachers also know that adapting their environment is usually relatively simple and that, by carefully arranging their classroom, their class will operate more efficiently and they will have more time for teaching and supporting individual students. For example, when teachers place students who need lots of help with students who can help them, then the teacher saves time and the student is still helped. When a teacher makes sure that a student with a hearing impairment is placed in the best position to hear what is going on, then the teacher doesn’t need to keep repeating instructions and the student is less likely to need to ask other students to repeat instructions. If in doubt, ask the student where they want to sit and why. When classrooms are well organized, everybody wins!
Description

How do effective teachers adapt the environment to accommodate students with special needs?

Effective teachers consider two issues when they plan how to adapt their classroom environment to accommodate students with special education. First of all, they make sure that their classroom and all classroom activities are accessible. Secondly, they make sure that their classroom is welcoming for all students.

Even though they each have different tasks, everyone's busy in this well organized classroom

Making the Classroom Accessible

Making sure that all students are able to access the classroom includes making sure that all students can move in and out of the room easily, and also move around easily. It also involves making sure that all students can access the lessons and other classroom activities. Students with hearing impairments have to be placed where they can hear what is going on, so effective teachers make sure that they are placed near the front of the room and where their ‘stronger’ ear faces the teacher. Effective teachers make sure that students with vision impairments are placed where they can see most clearly and where there are no obstacles blocking their view. Their best position will always depend on the type of vision impairment that they have.

Effective classrooms are well-organized places. They have students placed together in groups and the classroom has space between groups to allow students to move around freely. Effective teachers don’t just place students in groups at random. They make sure that students who need help from time to time are placed with capable, helpful students. They make sure that disruptive students are kept well away from each other. Effective teachers want their classroom to be a cooperative and productive place. They also ensure that students have designated places to keep their materials so that time is not
lost looking for things and students know exactly where to put things away. Students with learning difficulties often have trouble organizing their things and themselves. These students perform much better in well-organized classrooms where there are set procedures and routines.

Students with physical disabilities may need stair rails or a ramp to be built so that they can access their classroom. Teachers can seek assistance from the school and community for these things to be constructed. The classroom needs to have wide spaces between tables and groups so that students who may be unsteady on their feet, or who use a wheelchair or walking frame, can move around like other students (see Werner, 1987, Chapter 51 for some excellent ideas on how to modify areas for wheelchair or walking frame access).

HOW STEEP YOU MAKE THE RAMP DEPENDS IN PART ON WHO IT IS FOR.

Very steep slope of 1 to 6

Only possible with electric wheelchair or with help. Rarely possible for rider alone. Chair may tip backwards.

Fairly steep slope of 1 to 10

Possible for riders with strong arms; strong paraplegics

Gentle grade slope of 1 to 14

Possible for average riders and strong quadriplegics. This is the best slope for public buildings and rehabilitation centers.

From Werner (1987, p. 489)

Students with physical disabilities, epilepsy, vision impairments and medical problems, are particularly vulnerable in classroom and school environments. Teachers need to make sure that there are no sharp corners or other hazards that students could fall onto or bump into as they move around. Tripping is very easy, especially for students with vision impairments, so teachers need to train all students to keep the floor free of trip
hazards and to keep classroom objects, such as tables and chairs in the same places, so that students learn where they are and how to avoid tripping over them.

**Ensuring a Welcoming Classroom**

No one likes to be in a place where they don’t feel welcome and no one likes to think that they are causing problems for other people. Students with disabilities and other special needs are often made to feel unwelcome or that they are a burden. It is most important that teachers make sure that they do not embarrass students with special needs or damage their self-esteem in other ways.

*Placing students in groups encourages cooperative learning and peer tutoring. It also allows more open spaces around the room so students with mobility difficulties can move around more easily. Students with vision or hearing impairments can still be placed where they can see or hear best.*

Effective teachers always consider the feelings of students with special needs. These are the kinds of strategies that they use to help students feel welcome and worthy:

- Use sensitive, kindly students as peer tutors and helpers
- Never tolerate teasing, unkind comments or intolerance
- Always hand out special materials or worksheets in a discreet but matter-of-fact way
- Never be bothered by having to make special arrangements for students with special needs
- Always treat students with special needs with respect
- Always treat the parents of students with special needs with respect
- Always model appropriate treatment of students with special needs to others
- Use appropriate terminology and expect others to do the same
- Emphasize students’ abilities instead of their disabilities
Practical Activity
In groups of four, design a classroom layout for a class of 35 students. Demonstrate how your design caters for all students. In the class there are:
- 2 students with mobility difficulties (one uses a stick; one uses a walking frame)
- 1 student who is deaf in his right ear
- 2 students who are short-sighted
- 7 students who have mild hearing impairments
- 8 students who have learning difficulties (some of these students are students with mild hearing impairment)
- 1 very disruptive student

References

Module 2  Inclusive Special Education

Topic 6:  Peer Tutoring

Planned hours:  2 lectures (1 hour presentation; 1 hour student activities)
               1 hour student research & study

Introduction
Peer tutoring is a system of instruction in which pairs of students help one another to learn. The tutor’s role is usually held by a peer in the same class or school. A typical arrangement is one in which a more capable student assists a less capable student with a particular activity or skill area.

What will students learn in this topic?
- Students will explore ways of utilizing peer tutors
- Students will explore ways of improving peer tutoring arrangements
- Students will examine the role of peer tutoring in effective teaching

How is Peer Tutoring linked to other topics in Module 2 – Inclusive Special Education?
One of the challenges in special education is bridging the gap between what needs to be done for a student with special needs and what can be done for that student. Peer tutoring is a very useful strategy for helping the teacher to implement the individualized plan (Topic 2) and adapting the curriculum (Topics 7a, 7b & 7c) for students with special educational needs.

Class discussion
What is peer tutoring?
Does it happen very often in schools?
Who benefits from peer tutoring?
Is it fair for one student to have to teach another student?
How do people feel about peer tutoring?
   How do parents feel?
   How do students feel?

Rationale
What is the role of peer tutoring in effective teaching?
Students with special educational needs usually benefit significantly from individual assistance, even small amounts of individual assistance. Teachers recognize this but find difficulty in organizing their classroom and program so that they can spend extra time each day with the students in their class who experience difficulties. Teachers feel uncomfortable giving individual attention to a few students at the expense of other students in the class. Peer tutoring is one option that increases the amount of individual assistance available to students with special needs, without the teacher being required to deliver all of the individual assistance. Peer tutoring has the added advantage of benefiting the student who is the peer tutor as well as the student being assisted.
Description

What is peer tutoring?

There are two main types of peer tutoring:

- One student helping another student learn a new skill or some new information
- One student helping another student to practice or build up their skills

Sometimes peer tutoring is fairly informal. A typical arrangement is one in which a student who needs assistance is placed next to a student who is capable and kind, who will help the other student from time to time, as the need arises. Another, similar, arrangement is one in which a student with special needs is seated in the classroom in a group of more capable students who will help that student as the need arises. In fact, informal peer tutoring occurs in all kinds of cooperative learning activities, all kinds of group work and in many other day to day classroom situations. It should be noted that informal peer tutoring can be just as useful and just as effective as formal peer tutoring.

There are three main differences between informal peer tutoring and formal peer tutoring. Firstly, in informal peer tutoring, the tutor helps the other student with whatever they might need help with as it arises; the other student asks for help or the tutor notices that the other student needs help. In formal peer tutoring, the teacher specifies a particular task, which might be a particular skill to be learned or practiced. In this type of formal peer tutoring, the tutor would normally only be required to work with the other student for 15-25 minutes per day, although, when older students help younger students in a younger class, they may be required to work with them for 30 minutes or so.

Secondly, in informal peer tutoring, the student being assisted stays with their tutor or with a helpful group. The other difference is in training. In informal peer tutoring, the tutor is usually selected because they are just a helpful person. In formal peer tutoring, the teacher usually assigns a student as a peer tutor and provides some training in how to be an effective tutor. The training only needs to be brief, but peer tutors need to be taught how to communicate in a positive way, how to use examples and other practical ways of teaching, and how to deal sensitively with errors. Peer tutors also sometimes need to be reminded of how to treat the other student respectfully. Students being tutored may also need some training. They may need to be reminded of how to treat their peer tutor, why they need a tutor, what to do if they have a problem, and so on.

Some typical peer tutoring arrangements that have proven successful are:

- A more capable, helpful student tutoring another student in the same class
- A student of similar ability tutoring (working with) another student in the same class
- A student helping a student from a different class
- An older student helping a younger student from a younger class

Peer tutoring is used widely in Papua New Guinea schools, as it is a very sensible and efficient way to utilize the abundant human resources of the classroom, provides many benefits, and is readily accepted within Papua New Guinean cultures and traditions. Nevertheless, it is important to remember that, like most things, peer tutoring requires careful preparation and training by the teacher to be truly successful.
Advantages of Peer Tutoring
Peer tutoring provides benefits for students with special educational needs, students selected as peer tutors, other students, and teachers. The many advantages of peer tutoring include:

- Students with special educational needs receive more help than their can teacher can provide alone.
- Peer tutoring can be particularly effective because students can be better at explaining some things than teachers (they use simpler, more direct language).
- Other students in the class benefit because the teacher who uses peer tutors has more time to spend with many students.
- Students selected as peer tutors gain status in their class and with their parents.
- Students selected as tutors gain self-esteem.
- Peer tutors themselves learn more effectively as they clarify their thinking through teaching others. One who teaches also learns (Westwood, 1997, p. 208).
- Peer tutoring can help build student relationships and a more cooperative approach to learning.
- Teachers are able to provide more assistance to more students.

Tips for Successful Peer Tutoring
The outcome of peer tutoring is influenced by many factors including the type of material being used, the age and sex of the students involved, the level of achievement and amount of training the tutors and tutees have. Keep in mind the following tips for fostering successful peer tutoring:

- A student of any age may be either the tutor or the student being assisted. The older student does not necessarily have to be the tutor (but it often works better if they are).
- Peer tutors are often high achievers, but an achiever at any level might serve equally well as a tutor. A more important ability of the tutor is to be a helpful person who can teach without making the other student feel unworthy or diminished.
- Same sex partners usually work best in tutoring
- Be sensitive to cultural issues and avoid setting up situations that may be problematic for cultural reasons
- Peer tutoring is easy to set up but teachers should remember that tutors should be trained in how to interact with their students and in how to present the content.

When tutoring students with learning difficulties, it is best if the tutor helps the student practice in areas such as reading, spelling, number facts and so on. The peer tutor is not a teacher and should never be expected to make decisions about what a student needs.

- When establishing a tutoring program, keep in mind students with disabilities and other special needs. Sometimes students with disabilities can serve as tutors to their classmates. Also, an older student who has learning difficulties or another disability, or who is at-risk of school failure, can be an effective tutor for a younger student with or without a disability.
• A good time to have peer tutoring can be at the beginning of the school day as students arrive, in the middle of the afternoon when both the tutor and student need a change of activity, or near the end of the school day. As much as possible, tutoring in a content area should occur within the content area classes.
• Being prepared improves peer tutoring greatly. Have materials ready, and make sure the students know what is expected of them (tutor and student).
• Don’t overuse tutors; avoid peer tutor burnout!
• Reward tutors on a regular basis to maintain enthusiasm and interest. Peer tutors deserve rewarding!

In tutor training, make sure that the tutor learns:
  o How to break steps or processes into smaller steps
  o How to set up or organize the session
  o What to do if the student doesn’t understand
  o What to do if the student makes an error
  o How to show the student something that they don’t understand
  o How to praise and when to praise
  o How to give the student time to think and work things out
  o How to help and guide instead of doing things for the student
  o How to prompt, remind and revise

Practical activity
In groups of two, choose a skill, procedure, rhyme, song or other piece of information that you could teach to another person. Spend 5 minutes working out how you could teach it to your partner. Then take turns to teach it to your partner.
Did you prefer being the tutor or student?
What did you learn when you were tutoring?
How did you feel being tutored?
If you were to do it again, what changes would you make?

References

Module 2  Inclusive Special Education

**Topic 7a:** Adapting the Curriculum – Language Difficulties

**Planned hours:** 3 lectures (1.5 hours presentation; 1.5 hours student activities)
2 hours student research & study

**Introduction**

Many students with learning difficulties or an intellectual disability have difficulty with language, while some other students just have difficulty with some aspects of language. There is a range of types of language disorders and the reasons why some students struggle with speech or language can be complex. For a good general summary of the types and causes of language disorders, see Vaughn et al (2000, pp. 162-181) and Wright & Kersner (1998, pp. 1-5). Teachers need to understand, and respond to, the language difficulties that some students experience and the effects that language difficulties can have on students’ learning in other curriculum areas.

**What will students learn in this topic?**

- Students will examine a range of language difficulties experienced by students
- Students will examine ways in which language difficulties may be identified
- Students will explore ways of responding appropriately to the needs of students with language difficulties

**How is Adapting the Curriculum - Language Difficulties linked to other topics in Module 2 Inclusive Special Education?**

Language difficulties account for many of the other learning difficulties (such as difficulties with reading and other literacy skills (*Topic 7b*) and numeracy (*Topic 7c*)) experienced by students. Language difficulties can be difficult to diagnose and, very often, their cause is unknown. Language difficulties are sometimes neglected as teachers and parents often focus on the more obvious goals of literacy and numeracy at school, but it is important that language development is not overlooked. Students’ language development should always be considered in planning and IEP development (*Topic 2*).

**Class discussion**

What is language? What are the particular characteristics of language in PNG? Do any members of the group have experience of anyone with a language difficulty? What language difficulties might students have? What causes language difficulties?

**Rationale**

Language is the most pervasive area of the primary school curriculum, in that students access all other curriculum areas through the medium of language. Students who have language difficulties specifically, or who have language difficulties as a consequence of another disability (such as intellectual disability, hearing impairment or learning
difficulties), require special, individualized assistance with language development and language use if they are to succeed at school.

Teachers need to recognize language difficulties and know how to respond to them. Teachers need to adapt the language curriculum and the language-related aspects of other curriculum areas in order to address the needs of individual students. Teachers also need to be able to make these adjustments in the context of a busy and demanding classroom environment, so teachers need simple, basic strategies for adapting the language curriculum and responding to language difficulties.

**Class discussion**
What aspects of the primary school curriculum are affected by language difficulties? How are they affected? How can these effects be minimized?

**Description**

*What kinds of language difficulties are students likely to experience?*

There is a general assumption that, upon completion of their elementary school education, primary school students “already know how to speak, listen, read and write in their own language” (The Primary Curriculum in Papua New Guinea, 1998, p. 20). Unfortunately, however, this is not always the case. Many students have language difficulties that seriously affect their learning and performance at school. These difficulties often affect vernacular language and vernacular language-related activities, but they are compounded as students attempt bridging to English language and academic work in English. When this is the case, such students often have poor self-esteem, little confidence, and may appear to have a reduced attention span. Such students are highly likely to experience failure and greater loss of confidence as school demands increase.

Wright and Kersner (1998) refer to three general types of language difficulties:

1. **Difficulties with expressive language**

   Students may have difficulty with the form or content of language. They may be unable to sequence sentences or use appropriate grammar, or they may have articulation or phonological difficulties. Articulation refers to a student’s ability to pronounce words and sentences (e.g., stuttering, pronouncing ‘r’ as ‘w’). Phonemes are the units of sound in speech, so students with expressive phonological difficulties have difficulty with pronouncing certain sounds in speech, or with using them in such a way that the different sounds are contrasting (e.g., pronouncing ‘f’ and ‘th’ as ‘p’). Expressive language difficulties may result from a physical impairment (e.g., hearing impairment, nerve damage, cleft palate) or a cognitive difficulty (e.g., learning disability, intellectual disability), or it may simply be the case that the student has not had the opportunity to learn ‘correct’ pronunciation.

   Pronunciation varies greatly between communities in PNG, and the sounds of English are often used differently by different communities. Many PNG communities do not differentiate between some different English phonemes (e.g., ‘f’ and ‘p’). For students to learn to decode and read English, however, they need to learn to discriminate between such phonemes. Students with language difficulties are highly likely to have significant difficulty in these circumstances. Teachers need to be particularly sensitive
to, and value, these kinds of cultural characteristics and differences, and support students through clear explanations and the use of clear examples.

ii. **Difficulties with pragmatic skills**
Sometimes students have particular difficulty with the interactions in speech, for example, non-verbal communication, eye-contact, expressions and emphases. They might not know how to carry a conversation, or how to interrupt politely, or the particular implications of certain vocabulary (e.g., a student may not know how to form a question, so it may sound like a demand). Once again, different cultural groups in PNG use language and other communication forms differently from each other, so teachers need to learn to differentiate between pragmatic difficulties and cultural differences.

iii. **Difficulties with receptive language**
Receptive difficulties are more difficult to recognize than expressive or pragmatic difficulties but they may be more common. Some students have phonological difficulties, where they find difficulty with discriminating between sounds. They might not be able to tell that a word, such as ‘cat’ is made up of separate and distinct sounds ‘k’, ‘a’ and ‘t’ linked together, or different phonemes may sound the same (e.g., ‘t’, ‘th’, ‘f’, ‘s’, ‘sh’, ‘ch’). Such students may not seem to hear final sounds, suffixes and prefixes.

Other students’ difficulty with receptive language may stem more from difficulties with meaning, either of sentence structures or vocabulary. Abstract concepts, tense and inferences confuse such students. Some students may express plenty of meaningless language that masks their underlying difficulty.

As with other language difficulties, receptive difficulties may stem from a physical impairment, a cognitive impairment or a particular set of learning experiences.

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**Research task**
Rali is a student in Grade 4. She doesn’t enjoy school and her parents are considering removing her. Rali’s results are poor and she doesn’t have any friends at school. Rali is very shy, and only uses one word at a time when she speaks. She rarely asks questions. Identify four or five ways that you might be able to help Rali. Who would you involve? What would you do? Outline your reasons for involving the people you have decided to involve, and your reasons for doing what you have decided to do.

Vaughn et al. (2000, p. 181 (adapted)) suggest the following tips for identifying a student with possible language difficulties:

**Language form**
- Does the student mispronounce sounds or words and omit endings?
- Does the student comprehend and produce types of sentences similar to those of other students in the class?
- Is the student’s language as well formed and descriptive as that of the other students in the class?
- Are the student’s comprehension and production of language rules similar to those of other students in the class?
Language content
- Does the student comprehend and produce vocabulary as rich and varied as that of other students in the class?
- Does the student comprehend other students’ ideas and express his or her own ideas as effectively as other students?
- When talking, does the student have significant difficulty finding the word he or she wants to use?

Language use
- Does the student use different language for different purposes (e.g., to gain attention, to ask questions, to express feelings)
- Does the student take turns properly in conversations?
- Does the student initiate conversations?
- Does the student maintain a topic during conversations?
- Does the student have more than one style of interacting, depending upon the listener, situation and topic?
- Does the student recognize when the listener is not understanding, and try to clarify his or her meaning?

Research and practical activity
Select or develop a language-related objective for a student that you are working with. Outline your reasons for choosing this objective (Why did you choose this objective? How is it relevant to the language curriculum?). Develop at least two learning activities for your objectives. How will you know how effective your learning activities were? Implement the learning activities and report on their progress.

How do effective teachers adapt the language curriculum for students with special educational needs?
A whole language approach to language development, where language is taught in a purposeful way, in a realistic context, is encouraged in the Papua New Guinea Language Syllabus (Department of Education, PNG, 1998). Within this context, students with language difficulties can be assisted and responded to in relatively straightforward fashion by competent teachers. In general terms, teachers are encouraged to follow the regular curriculum, with modifications as follow:

i. Be a sensitive teacher
Students with language difficulties are often embarrassed or nervous about their particular problem. Although it is wise to encourage the involvement of such students in as many language activities and contexts as possible, it is unwise to place them in situations where they are likely to be embarrassed or frustrated. These situations may hinder, rather than improve, a student’s language development. Teachers need to be sensitive to students’ particular needs, limitations and fears.

Class discussion
What does being a sensitive teacher mean? What is a meaningful context?
ii. **Use meaningful contexts**
Teachers should encourage students with language difficulties to practice their skills in realistic, purposeful contexts. Such students can be included in the range of activities that occur throughout the school day and teachers can also develop role-play activities to create opportunities for development of language skills. Use meaningful, practical examples to strengthen students’ understanding of syllabus outcomes as they arise. Vaughn et al (2000, p. 184) describe an excellent tool for promoting language development and practice, in which a barrier is placed between two students so that they can’t see each other, and each student has to describe to the other student a drawing or simple structure that they have created. The listener tries to make the same thing by following the other student’s ‘instructions’.

![Class activity](image)

*Class activity*
In pairs, sit back to back. One person draws a picture on paper, and then describes what they have done to the other person. The other person tries to draw the same picture without seeing it. What difficulties did you experience? If you were to try it again, what changes would you make?

iii. **Use direct teaching**
*Whole language* approaches to language and literacy development generally need to be complemented by direct teaching methods, especially for students with learning difficulties. Teachers need to ensure that they supplement whole language activities with direct teaching of receptive as well as expressive language skills. For example, teachers should always include direct instructions, descriptions and discussions of meanings when introducing or reviewing new concepts and vocabulary. Teachers should model and demonstrate procedures and skills targeted for development. When
introducing new concepts, teachers should provide a range of examples of the concept, and point out the distinctive features of the concept examples. Teachers should also use non-examples when teaching concepts. Below is an example of the use of examples and non-examples that a teacher could use to teach the concept triangle. We could call this set of examples and non-examples a concept teaching set. Note that the teacher has used a range of examples of triangles, starting with a typical or classical example, but then introducing triangles of different size, shape and colour. In this way, the students learn that the concept triangle includes a range of quite different things. Note also that the teacher has used non-examples; starting with one (a parallelogram) that is very different from a triangle but then using one (the open shape) that is quite similar to a triangle. The teacher would also explain the actual definition of a triangle, but by using examples in a creative and structured way, the teacher will probably be successful in teaching this concept to all students, even those with significant language difficulties.

The teacher should follow up this presentation by pointing to the shapes in random order and asking the students, “Is this a triangle?” In this way the teacher can check the students’ understanding.

Another technique that effective teachers use to facilitate understanding of vocabulary and concepts, is to try to relate them to their context and to similar things, e.g., “It’s like …”, or “You’ll see them at …”, and so on (Vaughn et al., 2000).

Teachers should always ensure that their instructions and descriptions are very clear. This means that teachers need to be aware of the level of understanding that their students have and how explicit they need to be. It is better to assume that students might not understand, and to clarify information, than to wait until students get it wrong. Effective teachers always try to avoid setting students up to fail.

To ensure clarity, teachers also often use non-verbal cues, gestures, facial expressions, pictures and other aids. Effective teachers use whatever it takes to make sure that students understand.

### Class activity

In small groups, think of a concept you might wish to teach. Identify a range of examples of the concept. Make sure you include a typical example as well as quite different examples. How do they differ? Also identify two or three non-examples. Make sure your non-examples include at least one that is very different from the examples and one that is very similar to the examples. Discuss your concept teaching sets with the other groups.

### iv. Use appropriate pacing and pauses

Students with language difficulties often need more time to process verbal information and to produce speech. Effective teachers slow down the pace of their instruction and use frequent pauses to ensure that students have time to process the information. They also allow students more time to speak and express their thoughts, ideas and questions. They wait longer for responses to questions and don’t just choose the student who puts their hand up first! Rather, they make sure that students with language and learning difficulties are given more time and an equal opportunity to be involved in class discussions and to answer questions.
v. Use modeling and demonstration
Effective teachers provide excellent language models for students. It’s a good idea to think out aloud with students to model the thinking and language production process for students. It’s also a good idea to explain to students how and why certain language forms are being used in different situations, and to demonstrate this. Teachers can even role-play language interactions for and with students to demonstrate the language skills being taught more clearly.

What are some examples of adapting the language curriculum for students who need an alternative communication system?
Students who are unable to speak, due to a physical or cognitive impairment, may require an alternative communication system. Students who are unable to hear or understand verbal communication may also require an alternative communication system. Deaf students typically use sign language but sign language can also be used to assists some students with severe intellectual disability, because signs can be easier to learn than spoken words, in some cases. This is because words are transient; they disappear as soon as they are spoken, whereas a sign can be held in place, allowing the student time to observe it. Signs can also be physically modelled and prompted to aid understanding and production.

Sign language is a complex and extensive topic in itself. Sign language receives extensive coverage in Module 4 – Topic 3 Alternative Communication Strategies but
student teachers should review *Melanesian Signs for Communication with the Deaf* (PNG Department of Education, 1994).

Pictorial communication systems can be a very useful communication tool for students who cannot use spoken words or signs. The advantage of pictorial systems over sign language is that pictures are widely understood, unlike signs. Teachers can draw small pictures (or symbols) of important events (e.g., eating, drinking, toileting, playing) or objects (e.g., book, toy, pencil, food item) and paste these on a student’s desk or wheelchair table. A student who is unable to speak can communicate their basic needs and wishes by pointing to the relevant picture, and the teacher can also communicate to the student using the picture. Concepts such as *yes* and *no* can also be added in symbolic form.

**Practical activity**

Using cardboard or paper, design a pictorial communication board for a student with cerebral palsy who is unable to speak. Explain why you have chosen the pictures or symbols you have used. How would you decide what pictures or symbols to use for a real student?

**Further Reading**


**References**


Introduction
Doyle (1993; cited in Robinson, 2001. p. 170) suggests that 83 percent of a typical school day is spent on activities involving reading and writing. Literacy difficulties are the largest single area of special educational need and they affect students’ performance in all curriculum areas. Most other disabilities or learning difficulties (including behavioural problems) affect students’ progress in literacy. All teachers need to understand the literacy difficulties experienced by students, and know how to address them.

What will students learn in this topic?
- Students will explore the teacher’s role in assisting students with literacy difficulties
- Students will examine aspects of literacy in which students are more likely to experience difficulties
- Students will examine a range of literacy difficulties experienced by students
- Students will explore basic approaches aimed at addressing or preventing literacy difficulties
- Students will explore methods of supporting students who experience literacy difficulties

How is Adapting the Curriculum - Literacy Difficulties linked to other topics in Module 2 Inclusive Special Education?
Literacy difficulties are frequently associated with language difficulties (Topic 7a) and usually affect students’ performance in other curriculum areas, such as mathematics (Topic 7c). Literacy is often the focus of students’ individual educational plans (Topic 2). Literacy difficulties also account for many behavioural problems that students display at school (Module 3 – Topic 6).

Class discussion
In groups of 4 or 5, discuss the following questions:
- What is your experience with students with literacy difficulties?
- What were these students like?
- How does it feel when you have difficulty learning something?
- How does it feel when you’re the only person who seems to be having difficulty?
Rationale
All teachers need to understand the literacy difficulties experienced by students, and how to address them. Although there are no national Papua New Guinea data on the incidence of literacy difficulties in PNG schools, international research suggests that up to 20% of school students experience difficulty with literacy (Robinson, 2001). The teacher’s role in identification and support of students with literacy difficulties is particularly important in PNG as the rate of literacy among parents in PNG is low compared to more developed countries (PNG Human Development Report, 1998).

Students with literacy difficulties can easily be caught up in a downward learning cycle in which their literacy difficulties lead to negative consequences, which, in turn, exacerbate their literacy difficulties. Robinson (2001, p. 171) represents this cycle as follows:

![Downward learning cycle from Robinson (2001) p. 171](image)

Teachers are best placed to interrupt this kind of cycle. Effective teachers ensure that they take steps to prevent literacy difficulties, identify literacy difficulties and respond to the needs of students with literacy difficulties. Importantly, while the causes of literacy difficulties in students are commonly unknown, poor or inappropriate instruction is a known cause, and teachers who fail to respond to students’ difficulties or continue to provide inappropriate instruction, exacerbate the difficulties students experience. On the other hand, teachers who do provide instruction aimed at preventing failure, and who do respond appropriately to students’ literacy difficulties, can remove or dramatically reduce students’ literacy difficulties.
Description

What kinds of literacy difficulties are students likely to experience?

Students may experience difficulties with reading, writing and spelling. Difficulties with reading represent the greatest proportion of students with serious literacy difficulties, and reading difficulties have the most serious overall consequences, but students who are very poor spellers or writers may also suffer significant negative consequences, including reduced academic scores, poor self-esteem and low confidence. However, in Papua New Guinea, with its broad array of languages, its high incidence of ‘invented’ (largely phonetic) spellings of English and Tok Pisin words, there exists a high tolerance of spelling variations, so the negative consequences of spelling difficulties are likely to be less severe than in the more developed English-speaking countries. It is likely that a similar pattern applies in regard to the grammatical and syntactical structures of written English and other languages in PNG.

Reading difficulties, however, can have much more serious consequences. Students who struggle with reading typically have low confidence and self-esteem, and their reading difficulty causes problems across all other school curriculum areas. Students who struggle with reading tend to struggle with most other things at school. It can seem that there are nearly as many theories of why students sometimes struggle with reading, as there are opinions about the nature of reading itself; in other words, there is a multitude! However, the international field of reading research has converged to some extent since the release of Adams’ landmark study (Adams, 1990 see Snow et al, 1998) and approaches to reading failure prevention and remediation also seem to be reaching common ground in recent years. Vaughn et al (2000, pp. 372-3) provide an excellent, concise summary of the reading process, and implications for classroom action:

i. Reading as an interactive process

Readers interact with three cue systems when they read. There are grapho-phonic cues, syntactic cues and semantic cues. Syntax is the structure of language; so syntactic cues are the ways in which words are arranged in sentences and phrases that lead to understanding of printed language e.g., when we read The woman ate the fish, the syntactic cues tell us that the fish didn’t eat the woman!

Semantics refers to the meaning of the concepts in language, so semantic cues are largely the meanings given by words. In the example above, we need to understand the concepts of woman, ate and fish to derive meaning from the statement. Because the term ate is used (instead of eat or is eating), we know that the action has already occurred; it’s in the past tense.

Grapho-phonic cues are the symbols of written language, i.e., the print. Written English uses the alphabetic principle, meaning we use an alphabet of letters to form words. Graphemes are the printed symbols in written English while phonemes are the sounds in English, e.g., the word telephone is made up of 6 graphemes t-e-l-e-phon-e, which describe 7 phonemes, namely t-e-l-i-f-o-w-n.
Good readers use all of this information in an interactive way, and good readers use the other cues to find the meaning when one of the cues doesn’t help them, for example, we can usually work out the meaning of an unknown word by understanding its context and the meaning of the other words that we do know; and we can usually work out how it sounds from the grapho-phonic cues it contains.

Students can struggle with any of the cues in reading. In particular, students who are unfamiliar with spoken English are more likely to struggle with the syntax and semantics of written English. Students bridging from their vernacular language to English are highly likely to find difficulty with this. In English speaking countries, students are most likely to struggle with the grapho-phonic relationships in reading; in particular, phonological (or phonemic) awareness:

**Phonological Awareness**

In order to understand that printed words are made up of separate symbols representing the separate sounds of any given word, students must be able to pick out the separate sounds in the spoken word, e.g., the word *pig* has 3 separate sounds, *p-i-g* and a student must be able to separate (or discriminate between) those sounds in the spoken word, to understand how they are represented by 3 separate letters. Many students are not able to do this, and research shows that an inability to recognize rhyming and similar sounds, and to pick out individual sounds and syllables, in spoken words, is a key indicator that a student is likely to experience reading difficulties (Snow et al., 1998).

Students who struggle with any of the three main cueing systems of reading are likely to not learn to read, or read in a halting manner. Students need to be fluent readers to be able to understand (comprehend) what they are reading about, so any obstacle to fluent reading is going to limit a student’s ability to comprehend what they read.
ii. Reading as a strategic process
To be fluent readers who comprehend well, students also need strategies, such as decoding. For example, a student needs to know how to approach (or attack!) a new, unknown word, so they can work out how it sounds and what its meaning is. Students with good phonic knowledge can usually work out how words are likely to sound, and good readers also know to read ahead and examine the context to work out meaning. Students who don’t know these strategies typically struggle with reading and, especially, comprehension.

iii. Reading as a search for meaning
Good readers are able to make judgments and inferences about what they read. These strategies are necessary to derive meaning from most written material. Students with reading difficulties usually require these strategies or skills to be directly taught to them, by example and direct instruction.

iv. Reading as a process of constructing meaning
Readers can only understand the meaning of written material by connecting it to their own prior experiences, background knowledge, culture and interests. Consequently, reading should always be regarded as just one aspect of language and a student’s performance in reading will always be largely dependent upon their knowledge and experience of language.

v. Reading as a socially mediated activity
To some extent, students learn to read (and spell, and write) in a way that is similar to learning other aspects of language. That is, they learn in an interactive way with other students. They learn from each other. As students interact, they hear the attempts, mistakes and examples of other students, and that helps and accelerates their own learning. Students who are unable to engage in this process, do not learn as readily, so they begin to struggle in relation to their peers. Poor social and attentional skills can interfere with students’ progress in learning to read.

How do effective teachers adapt the language curriculum for students with literacy difficulties?
Much writing on assisting students with learning and literacy difficulties over recent decades has focused on building confidence and self-esteem, and on providing students with material that is relevant to their own particular context, background, needs and interests. More recent material continues this focus but more emphasis is now being given to the structural elements of literacy, especially phonological awareness and decoding strategies.

Creating a Positive and Meaningful Context
Snow et al (1998), Wengip and Bristow (2001, pp. 19-21), Vaughn et al (2000, pp. 373-4) and Robinson (2001, pp. 231-6) provide many useful tips for creating a positive and meaningful context for learning to read and write, and responding to literacy difficulties. For students with literacy difficulties, and those likely to experience literacy difficulties, it is essential that teachers provide an encouraging and positive environment. Wherever possible, reading and writing materials, and activities, should reflect students’ interests and be relevant to their everyday experiences. Reading material that is taken directly
from the students’ environment, and that is directly useful to the student (e.g.,
advertisements, comics, food tin labels, signs, known stories), can be a very powerful
teaching tool. Students also learn more efficiently when they experience plenty of
success so it is important that material and activities presented to students is aimed at
their particular skill level as well. Teachers can also write down students’ stories or help
students construct written stories, which can then be used as reading material for
practice and revision.

**Research**

Investigate library resources to find out:
What are the different ways in which teachers can make the classroom a
positive and meaningful place for students with literacy difficulties?

Always treating reading as a valuable and enjoyable experience is also a very important
approach for teachers to take. Effective teachers make sure that they always build
reading for fun, reading stories to the class and other enjoyable reading activities, into
their school day to set a positive example and encourage students to have a positive
attitude to reading.

**Responding to Actual Need**

Teaching is most effective when it responds to actual and immediate need. For a teacher
to respond to the needs of students with literacy difficulties, they must have a method
for assessing and monitoring students’ literacy development and progress. Westwood
(1997, p. 89) suggests that individualized assessment is aimed at finding answers to the
following questions:

- What can the child already do without help? What skills and strategies
  has the child developed?
- What can the child do if given a little prompting and guidance?
- What gaps exist in the child’s previous learning?
- What does the child need to be taught next in order to make good
  progress?

Creating *portfolios* of samples of students’ work, is an easy and very useful way of
keeping track of students’ progress in writing and spelling. Running records of students’
reading activities can be added to work sample portfolios. The simplest form of running
record is just a copy of a passage that a child has read, with the number of errors and the
type of errors noted, and the time taken to read the number of words. This kind of
record can be based on just one or two minutes of reading out aloud and should be taken
frequently *e.g.*, once per week. Students do not learn efficiently if they can read less
than about 80% of the words in a passage. If the student cannot read at least 80% of the
passage correctly, easier material needs to be provided. Listening to individual students
read is the best form of reading assessment, and allows the teacher to answer all of the
questions above, as long as the teacher is an active listener and provides prompting and
guidance, and asks the student questions during the session.

When teachers observe and listen closely to students, they can usually work out quickly
what individual students need, and assist each student with guidance, prompting and
practice, and by providing activities that the student finds challenging but not too
challenging. Teachers should always try to provide material in which only about 20% or less is unknown or difficult. When students feel successful, they perform better.

There are three areas of learning to read that students typically need assistance with; phonological awareness and decoding, sight word recognition, and fluency and comprehension. Students with literacy difficulties usually need assistance in these areas. Teachers should also ensure, however, that these areas are always included in literacy instruction as they are very effective in reducing the occurrence of learning difficulties. They are very powerful preventative strategies.

### Practical activity

**During practicum or an integrated practical experience:**

Select a student.

Find out from the student’s teacher what level of reading material they are up to.

Arrange for the student to read a passage of text for 1-2 minutes.

Note all the student’s errors, hesitations, self-corrects, and any obvious strengths.

How many words did the student read in one minute?

How many errors did the student make?

Do you believe the material was at the right level for this student? Why?

What specific skills does the student need help with? Why?

### Phonological Awareness and Decoding

Phonological awareness is a key reading skill, essential for decoding and an understanding of phonics and spelling, and the best known predictor of future success or failure in learning to read (Snow et al, 1998). Teaching phonological awareness is one of the most powerful failure prevention strategies that teachers can adopt. Vaughn et al (2000) summarize phonological awareness as follows:

- **rhyming**
  identifying similarities and differences in word endings

- **alliteration**
  identifying similarities and differences in word beginnings

- **blending**
  putting sounds (phonemes) together to form words

- **segmentation**
  dividing ideas into words, and words into syllables and individual phonemes

Phonological awareness is easily converted into learning activities. Young students generally find such activities enjoyable as well as helpful. Vaughn et al (2000, pp. 377-81) and Snow et al (1998) provide many useful strategies. Phonological awareness activities may include:

- **learning rhymes (rhyming)**
  - e.g., Let’s clap out the sounds in ‘pig’ – say sounds as we clap clap clap
  - e.g., Let’s clap out the parts of ‘kaukau’ – say parts as we clap clap

- **clapping out sounds or syllables in words and names (segmentation)**
  - e.g., How many sounds can you hear in the word ‘banana’? (6)
  - e.g., How many syllables in words (segmentation)
  - e.g., How many parts are there in the word ‘banana’? (3)
- making up new words by changing the beginning sound (alliteration)
  e.g., Here’s a word – ’dog’. Let’s start that word with another sound – ’fff’.
  What word does that make?
- making up new words by changing the end or middle sound (rhyming)
- making up words by blending sounds or syllables (blending)
- naming the beginning, middle or ending sound in words

Class discussion
As a class, discuss the phonological awareness training activities.
Try some out with the examples given.
Choose some new words and practice phonological awareness activities with them.

As students develop phonological awareness it is important that they also begin forming letter-sound relationships, *i.e.*, they begin to associate certain sounds (phonemes) with certain letters and letter combinations (graphemes). They learn, for example, that the letter *a* usually sounds like ‘a’ or ‘ay’, that the letters *f* and *ph* make the sound ‘fff’, and so on. Understanding letter-sound relationships is the starting point for decoding. The main decoding strategy is usually called *phonics instruction*, or just *phonics*. Usually, phonics should not be taught in isolation. A program which just consists of phonics can be boring and it is not relevant to students’ context or interests. Usually it is much better to embed phonics instruction in real, meaningful reading activities and include some intensive or practice activities in that way. Sounding out new words is a typical example of this kind of instruction. However, many students with literacy difficulties need a more explicit, more direct approach to phonics.

For students with, or likely to develop, literacy difficulties, teachers should invent or select phonics games and rhymes and develop activities in which students complete puzzles and worksheets that deal with letter-sound relationships and blends. Letter-sound relationships and blends should be introduced one at a time and teachers should not rush through this. Teachers should begin with the easier, clearer letter-sound relationships (*e.g.*, *m* – ’mmm’, *f* – ’fff’ etc.) and work towards the harder, less distinct relationships (*e.g.*, vowels, *x*, *y* etc.).

Blends should also be introduced in an easy-to-hard sequence (*e.g.*, *start with simple blends like ‘th’ and ‘er’ before moving on to more difficult blends like ‘ome’, ‘ough’ etc.*. There are many textbooks outlining different approaches to teaching phonics and it is likely that any recommended approach will be successful if taught carefully and sensitively.

*The most important thing for teachers to remember is that decoding strategies must be taught to students likely to experience difficulties and those already experiencing difficulties, and that decoding strategies should be taught gradually and carefully, in an easy-to-hard sequence.*
For a student to progress from simple phonological awareness to understanding letter-sound relationships and simple blends, a period of two or three years of regular instruction (5 – 10 minutes per day) may be necessary, although many students progress much faster.

### Research and practical activity

Using library resources, find a phonics teaching sequence. Select 5 blends from the sequence (two vowel blends and three consonant blends). Design a flashcard activity to build a student’s fluency in recognizing those blends. Describe why you have chosen your method.

### Sight Word Recognition

Many common words in English are not phonically regular, they don’t sound the way they’re written (unfortunately!). This fact can make it more difficult for some students to learn to read. Consequently, these words have to be learned by sight. In any case, it is useful for students to build up a sight vocabulary as this helps them to reader more fluently and, therefore, to comprehend what they read much better. Sight words can be taught in the context of ordinary readers and other reading material but many students need extra assistance to build up their sight vocabulary. Flash card drill is useful as long as it’s only done for a few (2-4) minutes each day and done regularly. Once again, new words should only be introduced gradually, so that students already know most of the words in the flashcard set they are presented with. A good system for teaching sight words is the match-to-sample system. In match-to-sample, the teacher lays out three or four words and holds up a word that matches one of the four words. The student has to point to the word that matches. Match-to-sample activities can be used to teach students to discriminate between words that are very similar in appearance. When students learn to discriminate between very similar words, they are much less likely to confuse similar words when they read. Teachers should start with very easy match-to-sample tasks and progress over time to more difficult tasks. Teachers should also invent different kinds of match-to-sample games and flashcard games to help students generalize what they learn and make learning more interesting. Flashcard activities work best when the words are taken from the readers and other reading material that students actually use in class.

### Fluency

When students read more fluently, they comprehend much better. Students read more fluently when they have a good sight vocabulary and good decoding skills. However,
teachers should not wait until those skills have developed before they begin to teach comprehension and fluency. Rather, these skills need to be taught gradually as students begin to learn to read. There is a multitude of strategies for encouraging fluency and teaching comprehension (see Snow et al, 1998; Vaughn et al, 2000; Robinson, 2001; Westwood, 1997). However, listening to students read frequently and regularly, provides the teacher with many opportunities to prompt, correct and praise and to model (demonstrate) fluent reading. Teachers should try to arrange for all students with literacy difficulties to read to them for a few minutes each day. In doing so, teachers should use a pause, prompt, praise strategy (see Westwood, 1997 pp. 128-9):

- when a student struggles with a word, **pause** to let them try to work it out
- **prompt** the correct pronunciation if the student can’t work it out after a few seconds, by asking the student to check the words around it and helping the student with the beginning sound etc.
- **praise** the student if they then get it right; or provide the correct word, have the student say it, **praise** the student for saying it right, and move on.

When listening to students read, teachers should always read some first to model good reading, then ask the student to read some, then read some more to the student, and so on. In this way, the teacher demonstrates good, fluent reading. Teachers can also train peer tutors or recruit volunteer helpers to help with listening to students read, but tutors and volunteers should always be trained by the teacher in how to pause, prompt and praise, and how to take turns at modeling and listening.

Another excellent strategy for building fluency is repeated reading. Students read the same book or passage several times until they become very fluent in reading it, instead of always going straight on to a new book. Not only does this method build confidence but it also familiarizes students with reading more fluently. In effect, students model fluent reading for themselves.

Students should be reading material that is at their instructional level; that is, not too easy, but not too hard. Trying to read material that is too hard is frustrating for the student, and likely to reduce, rather than improve, their chance of becoming a better reader. Teachers can take a record of a student’s reading accuracy and fluency to determine whether certain reading material is really at the student’s instructional level:

<table>
<thead>
<tr>
<th>Easy</th>
<th>Harder</th>
</tr>
</thead>
<tbody>
<tr>
<td>ball</td>
<td>nne</td>
</tr>
<tr>
<td>ooze</td>
<td>one</td>
</tr>
<tr>
<td>run</td>
<td>one</td>
</tr>
</tbody>
</table>

**An easy match-to-sample activity**

**A harder match-to-sample activity**
Taking A Record of Reading Accuracy

1. Select a part of a student’s reader that has not previously been attempted by the student.

2. Allow time for the student to read the page unassisted before testing.

3. Ask the student to read for one minute – do not prompt or provide any assistance.

4. Record each error on a separate form with a stroke:

5. If the student self-correction without any prompting, cross the stroke:

Example:

6. Count the total number of words read after one minute

7. Count the number of errors (don’t count the self-corrections)

8. Calculate the number of words read correctly

9. Calculate the accuracy level as a percentage

As a very general rule, accuracy rates should be considered as follows:

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Accuracy Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>95 – 100%</td>
</tr>
<tr>
<td>Instructional</td>
<td>90 – 94%</td>
</tr>
<tr>
<td>Frustrating</td>
<td>&lt;90%</td>
</tr>
</tbody>
</table>

**Practical activity**

1. Select two students from younger primary grades
2. Select a book at the appropriate grade level
3. Design a form to record the students’ accuracy rates
4. Assess the two students’ accuracy levels on the selected book
5. Report your results and recommendations

**Comprehension**

One of the more important developments in reading research over recent decades has been the new emphasis in teaching comprehension. For a long time, teachers have tested comprehension (in fact, a lot of testing right across the different curriculum areas has really been a form of reading comprehension testing) but not taught comprehension, or comprehension strategies, explicitly. For students with learning difficulties to develop good reading comprehension strategies, these strategies need to be taught.
There are at least four levels of comprehension (Westwood, 1997, pp. 129-130):

- **literal comprehension** recognizing the main idea, understanding the words, understanding literal cause and effect, understanding literal sequence
- **interpretation** inferring, reading ‘between the lines’, drawing conclusions
- **critical reading** judgment about the quality, value, accuracy or truthfulness of what is read
- **creative reading** the reader goes beyond the writer’s material and generates new ideas from it

Basic strategies for teaching comprehension to students with literacy difficulties include:

- frequent opportunities for reading text
- direct instruction in comprehension strategies
- cooperative learning activities in which students discuss the meanings and their interpretations of texts

Teachers should model comprehension strategies in order to teach them, as follows (adapted from Westwood, 1997, p. 131):

- preview material before reading it
- find the main idea in a paragraph
- ask questions (to self) about the paragraph
- make predictions about what comes next
- summarize the material.

A simple strategy for helping students to progress from literal comprehension to interpretation is to model, prompt and teach students to ask the question as they read a paragraph and attempt comprehension questions, *Is the answer right there in the book, or in my head?* Retelling stories and summarizing stories or passages are excellent ways in which students can learn and practice comprehension, and teachers can model these activities.


**Further Reading**


**References**


Module 2  Inclusive Special Education

*Topic 7c: Adapting the Curriculum – Numeracy Difficulties*

**Planned hours:**
- 2 lectures (1 hour presentation; 1 hour student activities)
- 2 hours student research & study

**Introduction**
Numeracy, like literacy, is a highly valued set of academic skills. Parents usually expect their children to become competent in mathematics at school, and even students with moderate to severe intellectual disabilities are usually involved in some kind of mathematics program. Students with learning difficulties usually struggle to some extent with mathematics and their difficulties can be very obvious to parents, other students and themselves. As a result, students with mathematics difficulties often display poor self-esteem, low confidence and a reluctance to attempt or practice mathematics activities. Effective teachers try to identify students’ mathematics difficulties as early as possible, for that reason, and also try to respond to any existing need. Students with mathematics difficulties respond well to corrective methods and all student teachers need to develop skills in responding to the needs of students with mathematics difficulties.

**What will students learn in this topic?**
- Students will explore the teacher’s role in assisting students with mathematics difficulties
- Students will examine aspects of mathematics in which students are more likely to experience difficulties
- Students will examine a range of mathematics difficulties experienced by students
- Students will explore basic approaches aimed at addressing or preventing mathematics difficulties
- Students will explore methods of supporting students who experience mathematics difficulties

**How is Adapting the Curriculum - Numeracy Difficulties linked to other topics in Module 2 Inclusive Special Education?**
Mathematics difficulties are often associated with language difficulties (*Topic 7a*) and literacy difficulties (*Topic 7b*). Mathematics is often a focus of students’ individual educational plans (*Topic 2*). Mathematics difficulties, like literacy difficulties also account for many behavioural problems that students display at school (*Module 3 – Topic 6*). Mathematics also includes many procedures and sequences of activities, so task analysis (*Topic 3*) is an important mathematics teaching method.
Class discussion
Why do some students struggle with mathematics?
Why do many people think that mathematics is very difficult?
Remember someone who finds mathematics difficult:
• Which skills in mathematics did they find most difficult?
• Why?
• How do you know?
Why do some students dislike mathematics?

Rationale
Mathematics is a set of academic skills that is highly valued by parents, the community, and students themselves. The skills and knowledge that make up mathematics are often very clear so students usually have a very clear idea of whether or not they have these skills. Difficulty and failure in mathematics can be very obvious to teachers, parents, other students and the struggling students themselves. As a consequence, students with poor skills in mathematics frequently suffer a general loss of confidence and low self-esteem, so difficulties in mathematics can have a damaging effect beyond the mathematics curriculum area. Additionally, the skills of mathematics are necessary for many essential aspects of daily life. A less obvious, but equally damaging, consequence of mathematics difficulties, can be a failure to develop students’ abilities to explore, reason logically and to approach problem-solving tasks logically.

Teachers are able to greatly influence students’ progress in mathematics. Mathematics development is clearly influenced by the type and quality of instruction received (Westwood, 1997; Vaughn et al., 2000) so teachers are able to choose instructional strategies that largely prevent mathematics difficulties from emerging or becoming a greater problem. Corrective measures are also often very successful. Effective teachers make sure that they check their students’ skills in mathematics and take steps to prevent any difficulties from arising or becoming greater, and they take corrective measures to address any specific difficulties that students have.

Description
What kinds of mathematics difficulties are students likely to experience?
Performance in mathematics is clearly influenced by two main factors – individual characteristics and education (including home and community influences).

1. Individual Influences
Students with intellectual disability, learning difficulties, and a number of other disabilities are likely to find difficulty with mathematics or with just some aspects of mathematics. Other students just have difficulty with mathematics, although such students may also have difficulties with logical reasoning and other mathematics-related skills. On the other hand, some students who struggle with reading, language, and some other aspects of the school curriculum, are surprisingly competent in mathematics, especially numeracy. Kosc (1981; cited in Vaughn et al., 2000, p. 434) suggests three variables that may influence an individual’s performance in mathematics:
i. **Cognitive and neuropsychological factors**

Intelligence, ability to sustain attention, and cognitive learning strategies may all influence a student’s progress in mathematics. Students also, often have specific difficulties, such as *spatial awareness* problems and memory problems. Researchers also continue to investigate the degree to which an individual’s memory is influenced by their educational experiences, just as they continue to investigate how memory influences learning.

Students with poor spatial awareness can have difficulties with relative position (*i.e.*, they might have trouble working out concepts like above, below, beside, behind etc.), distances, measurement and working out *abstract relationships*, such as geometric drawings, perspective, and so on.

Students with memory problems might not be able to learn number facts (*e.g.*, addition facts, multiplication tables, number patterns) easily, especially if their instruction doesn’t include appropriate levels of practice and drill.

ii. **Personality factors**

Attitude is a major influence in students’ approaches to, and performance in, mathematics. Some students simply believe that they can’t do mathematics, whilst others just don’t seem to like it. Student behaviour can influence performance in mathematics, while poor behaviour and problems with attention can be a consequence of a student’s difficulties with mathematics. Teachers should note that students’ attitude to mathematics can be heavily affected by the quality and type of instruction they have received in mathematics.

In addition, teachers should also consider the needs of students with disabilities other than learning difficulties. Students with more severe intellectual disability are likely to have great difficulty learning mathematics skills and concepts, so teachers need to consider only the most essential numeracy skills required for daily living for these students, such as operations with money and trading concepts, and quantities for food preparation. Students with some physical or sensory impairments may also require modification of curriculum goals and instruction. For example, blind students have great difficulty with concepts such as perspective, horizon and so on, and also cannot memorize the visual number patterns that sighted people use. Blind students need other ways of remembering and recognizing number patterns, so teachers use abacuses and other adapted devices to help these students.

2. **Educational Influences**

There has been much debate about whether students need a highly structured approach to learn all the many skills of mathematics, or whether a good mathematics programs should use discovery learning and other constructive techniques to encourage students to *think mathematically*. Researchers have found that students with numeracy difficulties often haven’t been provided with ample practice in basic, essential skills, such as addition facts, number patterns, multiplication facts, and so on. On the other hand, researchers have also found that some students are well able to perform basic number operations but have very poor problem-solving skills. Researchers have also found that students who have been provided with mathematics instruction consisting
largely of drill and number operations can be unmotivated. Westwood (1997, pp. 167-8) lists the instructional characteristics that can disadvantage students with mathematics difficulties:

- The teacher presents work that is too far ahead of the student’s ability or knowledge, so the student falls behind and loses confidence
- The teacher has not structured their discovery learning mathematics activities to provide enough practice, and the teacher has not followed up the activity to check learning and provide additional information and practice
- The teacher has used concepts and terms that the student cannot comprehend
- The teacher has not used concrete materials and practical activities to reinforce and assist students, or has stopped using them too early in the student’s development
- Because the student has difficulty with problem-solving, and language-related activities, the teacher just gives the student a ‘diet’ of algorithms and computational exercises, so the student does not learn how to apply their mathematics skills, and their mathematics learning isn’t meaningful
- The teacher has progressed their teaching according to the calendar or schedule, instead of monitoring their student’s performance, using corrective feedback and moving forward when the students’ have grasped the concepts and skills that the teacher intended them to learn
- The teacher has not provided enough revision, so once a concept or skill has been taught, the teacher has assumed that the students will always remember it and remember how to use it. The teacher has forgotten that a mathematics program should be provided as a spiral so that all topics and skills are revisited from time to time

Less effective teaching of mathematics is characterized by infrequent review and revision, demonstrations which are too brief or unclear, insufficient guided practice, and too little corrective feedback


How can the mathematics curriculum be adapted so that students with numeracy difficulties can learn more effectively?
Mathematics cannot be taught effectively to all students through incidental teaching, and mathematics cannot be taught effectively by just teaching number operations and algorithms. Effective teachers take a balanced approach to teaching mathematics.

Providing the Right Content at the Right Time
Students perform better when the teacher has high expectations, unless the teacher’s expectations are simply too high. When teaching students with learning difficulties, it is important that teachers have high expectations of what students can be taught to achieve but it is also important that teachers have a realistic idea of what students need to learn and can be taught with the resources and time available. Teachers need to identify what content is essential and then find the right way to teach that essential content; having an attitude that the student will learn the skill if the teacher can find the right way to teach it. For students with significant learning difficulties or intellectual disability, teachers should emphasize only those skills that are required for daily living. MacDonald (1979, cited in Robinson, 2001, pp. 212-3) suggests that the following mathematics skills are the most important for daily living:
• a structural understanding of whole numbers
• basic number facts of addition, subtraction, multiplication and division
• an ability to analyze and solve practical problems involving money, distance, measurement (including quantities) and time

While it is important that teachers focus on essential skills for students with difficulties, and provide plenty of demonstration and guided practice in those skills, it is just as important to focus on skills that students recognize as useful and important to them. For this reason, teachers should utilize materials and situations that are drawn from students’ daily lives. For example, food items, cooking equipment, tools, toys and other things that students use daily should be used in mathematics learning activities that demonstrate to students how mathematics is used to solve realistic, daily problems.

Marbles, nuts or pebbles make good counters for demonstrating number facts

If the teacher moves ahead too quickly for some students, then those students will not learn. On the other hand, if the teacher moves forward on the curriculum too slowly, then the students will not learn anything new. In order to present the right content at the right time, teachers must monitor and record their students’ progress. Having a list of the skills to be taught and keeping a record of what students are up to is the simplest way to do this. Another simple technique is keeping samples of students’ work in a folder. This type of record-keeping is called keeping a portfolio of a student’s work. Usually, students can keep their own portfolio and teachers simply need to review the portfolio from time to time. Teachers should check their students’ progress regularly and as often as necessary to have a good idea of what students are up to. A quick weekly check of progress works very well and a teacher can easily check each student’s progress once per week.

Teachers should always adopt a mastery learning approach to teaching essential skills in mathematics. This means that the teacher should never move on to the next skill or concept until the student has mastered the current skill or concept that he or she is working on. Most researchers and practitioners suggest that mastery is achieved when the student scores above 80% on that particular skill or concept. For example, if a student completes 20 simple addition exercises of the same type and achieves a success
rate of over 16/20, then the teacher can assume that the student has mastered that particular skill. Teachers should remember though that mastery can be lost again if the student is not given ample opportunities to revise mastered skills from time to time.

**Where to Start**
Assessing a student with difficulties’ current performance level is very important. Westwood (1997, pp. 172-3) provides an excellent guide for finding a student’s level:

<table>
<thead>
<tr>
<th>Level 1</th>
</tr>
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<tbody>
<tr>
<td><em>If the student’s performance in basic number is very poor, consider the following. At this stage almost all the assessments will need to be made at an individual level, using appropriate concrete material such as toys, found materials, pictures and number cards.</em></td>
</tr>
</tbody>
</table>

Check the student’s knowledge of vocabulary associated with number relationships (e.g., ‘bigger than’, ‘altogether’, ‘less’, ‘share’ etc. Then check the following knowledge and skills in the following order.

Can the student:
1. sort objects given one attribute (colour, size, shape etc.)?
2. sort objects given two attributes?
3. produce equal sets of objects by one-to-one matching?
4. count correctly objects to ten? To twenty?
5. recognize numerals to ten? To twenty?
6. place number symbols in correct sequence to ten? To twenty?
7. write numerals correctly to ten? To twenty?
8. understand ordinal values (e.g., fifth, tenth, second etc.)?
9. perform simple addition with numbers below ten in written form (e.g., $3 + 5 = $)? With or without concrete materials?
10. perform subtraction with numbers below ten, in written form?
11. count-on in a simple addition problem?
12. answer simple oral problems involving addition or subtraction with numbers below ten?
13. recognize all coins and money notes?
### Level 2

If the student’s performance in mathematics is slightly better than Level 1, consider the following areas.

Can the student:

1. carry out simple mental addition with numbers below twenty?
2. carry out simple mental problem-solving without use of finger-counting?
3. carry out simple subtraction mentally?
4. perform both vertical and horizontal forms of simple addition
   
   \[ \begin{align*}
   3 &\quad + 5 \\
   \quad + &\quad 5 \\
   \hline
   \end{align*} \]

5. understand the commutative law in addition (i.e., that the order of items to be totaled does not matter)? Does the child see that 3 + 5 and 5 + 3 will give the same total?
6. understand additive composition (i.e., all the ways of getting a set total, e.g., 5 is 4 + 1, 3 + 2, 2 + 3, 1 + 4, 5 + 0)?
7. understand the complementary or reversible character of addition and subtraction (e.g., 7 + 3 = 10, 10 – 7 = 3, 10 – 3 = 7)?
8. watch an operation demonstrated using concrete material and then record it in written form?
9. translate a written equation into a practical demonstration (e.g., use sticks to demonstrate 12 – 4 = 8)?
10. listen to a simple real-life situation described in words and then work the problem in written form (using numbers below twenty)?
11. recognize and write numerals to fifty?
12. tell the time?
13. name the days of the week?
14. name the months of the year?

### Level 3

If the student is able to succeed with most items in the previous levels, consider these questions.

Can the student:

1. read and write numerals to 100? Read and write sums of money?
2. halve or double numbers mentally?
3. add money mentally? Work out change mentally?
4. recite the multiplication tables and answer random table facts?
5. perform addition algorisms with H T U without carrying? With carrying?
6. understand place value with H T U?
7. perform subtraction algorisms without exchanging? With exchanging?
8. perform multiplication algorisms?
9. perform division algorisms?
10. recognize fractions: ½, ¼, 3 ⅓, 7 ¼, 0.8, 5.9 etc.?
11. read and interpret simple word-problems?
**Research and practical activity**

During practicum or an integrated practical experience:
Investigate the mathematics learning needs of one student.
What is the student’s main area of need?
What specific skills does the student need help with? Why?

or

Implement Westwood’s test to determine a student’s level of need and specific needs. You will need to:
- prepare an activities and materials for the different test items (e.g., Level 1, item 1 – basic shapes to be sorted by shape, colour & size)
- discuss a starting point for the test with the student’s teacher or parents (start below the level you think might be about right),
- design a simple form to record results,
- implement the test and record results,
- report your results, noting any identified areas of need, and your recommendations,
- plan and implement an instructional program to address the identified need (use task analysis, if appropriate), and
- report all progress and program changes.

**Providing the Right Amount of Information and Practice**

Discovery learning and problem-solving approaches to mathematics teaching can help make mathematics more fun and more meaningful for students. However, for students with difficulties in mathematics, these approaches have to be supplemented with additional instruction, drill and practice. For example, a student learning to perform basic addition operations might only come across one instance of an addition operation once in a problem, and the student has to work out at the same time, what the problem is, what the words mean, what sort of arithmetic is required, and so on. For a student with mathematics difficulties, this style of instruction is not enough. The student with mathematics difficulties will need a number of clear demonstrations of how to do addition operations and plenty of guided practice in that particular skill. It is important that students do not just do arithmetic operations all the time (they need to engage in discovery learning activities and problem solving too) but they must have plenty of clear, explicit instruction in all mathematics skills and concepts and they must be given plenty of guided practice.

Fluency in number facts and mathematical operations is very similar to fluency in reading. Fluency leads to greater understanding and comprehension, and the student has a much better chance of being able to apply the skills they have mastered. To build fluency in mental arithmetic and other operations in numeracy, there is probably nothing better than a daily speed and accuracy exercise. Using either a worksheet, a chalkboard or oral questions, a student or a group of students is required to complete a
number of algorisms or simple mathematics exercises daily. The specific items are changed daily but their level of difficulty is maintained or only increased gradually, and students try to complete the exercises in as short a time as possible. **Teachers should note, though, that fluency exercises should not be used as a student's total mathematics program; students must be applying their skills to real-life situations as often as possible.**

Students with mathematics difficulties need mathematics to be taught in a way that allows them to master one skill or concept at a time, so that they only proceed to the next skill or concept when they have mastered the previous one. Mathematics skills, especially numeracy, tend to be hierarchical. This helps teachers to organize their teaching targets into an easy-to-hard sequence and to keep good track of where students are up to (see Robinson, 2001, p. 217 for an example of an addition hierarchy).

**Quality Instruction That the Students Understand**

Effective teachers have the philosophy that **all of their students will learn when they find the right way to teach them.** Quality instruction is simply instruction that works. The best instruction in the world becomes the worst instruction if it does not teach the students. There are styles of instruction that are usually effective in teaching mathematics skills and concepts (and other curriculum skills too!) to students with learning difficulties, however (although, teachers should always be prepared to experiment and explore ways of finding new instructional techniques for their students).

**Explicit Instruction**

Explicit instruction is direct teaching. The teacher tells the student, or demonstrates to the student, exactly what they want the student to learn. The student is not left to discover the skill or concept themselves and the teacher does not simply hope that the student will 'pick it up'. Teachers should arrange some practical discovery-learning experiences in which the student can apply the skills already learned but discovery-learning is not a useful technique for teaching new skills or concepts to students with learning difficulties. Explicit instruction is generally much more effective for students with difficulties. Explicit instruction involves demonstrating to the student what they need to know, checking their learning through guided practice, and revising that learning later to make sure that the knowledge is being maintained.

Explicit instruction also includes steps to facilitate **generalization.** Students learn and practice their skills and concepts with different sorts of materials and in different contexts so that they learn that the same skill, concept or definition applies in different applications and with different things. For example, it is important that students do not learn to count and recognize number patterns by just using blocks or counters all the time. The effective teacher changes the materials from time to time so that the students perform similar operations with nuts, sticks, food items, marks on paper, and so on. The teacher also changes the problems that are set to different kinds of problems, so that the student learns to apply their skills in different contexts.

Effective teachers also utilize good concepts instruction, which involves demonstrating the breadth or range of a concept. Note the following example:
A Teaching Sequence to Introduce the Concept ‘Under’

The line is under the word big

The 4 is under the 6

The 3 is not under 5

The ball is not under the moon

The grass is under the tree

The snail is under his shell

The teacher uses different examples to demonstrate the concept under, and a range of non-examples to show what isn’t under. In a real classroom, the teacher would use real objects as well as written material to demonstrate concepts like under.

Explicit instruction also involves the teacher teaching explicit strategies to students. For example, how does a student learn how to solve problems? How do they know what steps to take? How do they know what kind of mathematics operation to use? Fast learners will often make up their own strategy through a process of logical reasoning and practice but students with difficulties need strategies to be taught to them explicitly. The RAVE CCC strategy described by Westwood (1997, p. 184) is a useful one for students with difficulties:

RAVE CCC Problem-Solving Strategy

R Read the problem carefully
A Attend to key words which may suggest the process to use (e.g., share, less than)
V Visualize the problem (you may even make a sketch or diagram)
E Estimate the possible answer
C Choose the numbers to use
C Calculate your answer
C Check your answer against your estimate

Easy-to-hard Sequences

The skills and concepts in mathematics are usually hierarchical, that is, there are hierarchical sequences in skill areas such as addition, subtraction, geometry, and so on, in which the sequence starts with simple, easy skills (e.g., 1 + 1 or plain 2-dimensional shapes) and moves on to much harder, more complex skills (e.g., K250.76 + K54.00 + K6,776.31 or complex, 3-dimensional layered shapes). Teachers using a mastery learning approach can use this feature of mathematics to advantage because they can always begin with easier skills or concepts and move gradually to
harder ones. Note that the assessment schedule described above (Westwood, 1997) is laid out in an easy-to-hard sequence.

Match-to-sample techniques are very useful for teaching mathematics skills and concepts in easy-to-hard sequences. The principle of match-to-sample is very simple and can be used with concrete materials and flashcards, or on worksheets, chalkboards, and so on. A sample is presented to a student and the student has to choose a matching item from a range of items (it’s a multiple-choice technique). The more similar the range of items are to each other, the harder the exercise is for the student. Match-to-sample is an excellent strategy for teaching students to recognize number patterns, associate numerals with words, identify shapes, and so on. In fact, different match-to-sample techniques can be used to teach or reinforce most skills and concepts in school-level mathematics. Match-to-sample techniques are very valuable for teaching students with learning difficulties because it is a very clear form of instruction and very gradual changes in level of difficulty can be arranged.

Examples of different match-to-sample teaching arrays

Practical activity

In small groups, using paper or a chalkboard:
Design sequences of match-to-sample arrays to teach (1) the concept seven and (2) the concept between. Make sure your sequence is an easy-to-hard sequence and that you vary the position of the examples and non-examples, and the type of examples and non-examples.

Using Concrete Materials

Many mathematics skills, particularly algorisms, have been taught without much use of concrete materials. Many students learn reasonably effectively in this way. However, students with learning or specific mathematics difficulties are not likely to. Teachers should always use blocks, sticks, nuts, counters or any other suitable concrete materials to clearly demonstrate mathematics operations. The concepts of carrying and exchanging in arithmetic are abstract concepts that students often find very confusing. Concrete materials should always be used to demonstrate and revise these skills, and it
is important that demonstrations are repeated frequently. Students must also perform these operations with concrete materials. Students can easily gather materials to do this (e.g., leaves, sticks, stones, shells) but they need guided practice as they learn to perform the operations. It is important that students see how written algorisms are simply a code for practical operations with real objects.

**Making Mathematics Fun and Purposeful**
If students are given a diet of just drill and practice in mathematics, they will not be motivated and they are not likely to be successful, even though the skills being taught and practiced may be just what they need. Like all other students, students with difficulties learn more effectively when they work with other students in cooperative, meaningful activities. A good mathematics program for students with difficulties has a good balance of cooperative learning, practical activities and some individual or small group drill and practice. Effective teachers always build in some individual teaching and monitoring as well. Mathematics provides students and adults with practical, useful skills that can be very enjoyable to learn and use. It is essential that teachers try to make sure that students with difficulties have enjoyable mathematics learning experiences so that, even though they may struggle sometimes, they remain interested, motivated and confident. Mathematics games can be an excellent learning tool and teachers should build up a pool of mathematics games and fun ideas for teaching mathematics. Even intensive drill and practice can be fun for a few minutes each day if it is provided in the form of a game.

<table>
<thead>
<tr>
<th>Research and practical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find a mathematics game in a textbook, or design a game yourself, that you believe may be suitable for teaching a mathematics skill to a student with learning difficulties.</td>
</tr>
<tr>
<td>Describe the game and the skills or concepts it is supposed to teach.</td>
</tr>
<tr>
<td>How is this game suitable for students with difficulties?</td>
</tr>
<tr>
<td>How and when could you use this game?</td>
</tr>
</tbody>
</table>

**Using and Giving Feedback**
Teachers need to know what their students are up to. This is especially true of students with difficulties as they need instruction that is arranged to meet their needs. Simple monitoring systems (as described earlier) assist the teacher to keep in touch with the learning progress of these students. However, it is also important that teachers keep students informed of their learning progress. Students need to know what is expected of them, how they are going and what to do next (what to aim for). In this way, students remain focused on the important skills that the teacher aims to teach them and they also begin to take greater control of their own learning. Like most people, students need to know where they are going and where they have been. Teachers should praise students when they have demonstrated some progress, provide guidance when they need it and inform students of what they need to work towards. Effective teachers keep students informed of their learning progress.

**Revision and Guided Practice**
Once a student has learnt a skill or concept, they need to practice it and revise it to achieve mastery and to retain the skill. If students are simply left to practice learned
skills, they may begin to simply practice mistakes. If this continues, all their previous learning can be undone. Students need to be guided through practice and teachers need to monitor their students’ practice to make sure that students remain on the right track.

Revision is equally important. Even once students have mastered certain skills or concepts, they need to revise their learning from time to time. Teachers should always make sure that students revise material throughout each year. Giving students set tasks and problems to solve in cooperative learning activities can be an excellent way to do this. Providing games that reinforce certain skills is another excellent method. Effective teachers always make sure that their schedule for each school term contains plenty of revision of material; especially for students with difficulties.

Further Reading

References

